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Learning to read in regular and special schools: a follow-up study of students with Down Syndrome

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Abstract

In 2006, a questionnaire was sent to 160 parents of children with Down syndrome in Dutch primary education (special and regular) with a response rate of 76%. Questions were related to the child's gender, age and school history, academic and non-academic skills, IQ, parental educational level, and the extent to which parents worked on academics with their child. In a 2010-follow-up, out of these 121 parents, 115 (95%) filled in a questionnaire on reading and school placement of 16 of these children, IQ was unknown. These children were excluded from the analysis.

Controlling for reading scores at time 1 (2006) and the other 2006-variables, ANCOVA's showed that reading scores at time 2 (2010) were higher for children the more years they had been in a regular school between time 1 (t1) and time 2 (t2). This was true for the total group and particularly for the younger children (< 9 years), whether all children or

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only children still in regular education in 2006 were included. Predicting change scores confirmed this advantage of regular placement, but only in the younger children.
Particularly during the first years of primary school, reading development of children with Down syndrome appears to be stimulated by regular school placement.

Keywords: Academics; Down syndrome; Inclusion; Inclusive education; Intellectual disability; Reading.

1. Introduction

Since the mid-1980s in many countries, including the UK (Cuckle, 1997), Australia (Bochner & Pieterse, 1996) and the Netherlands (de Graaf, van Hove, & Haveman, 2014; Scheepstra, 1998), more and more children with Down syndrome are entering regular schools. On basis of information of the Dutch Ministry of Education and of the Dutch Down Syndrome Foundation (SDS), de Graaf *et al.* (2014) estimate that 56% of all Dutch children with Down syndrome born since the 1990s start their school career in a regular school. Of the children starting in regular education, approximately 40% is still in a regular school at the end of primary education (at the age of 12 years). For children with Down syndrome, the parent's choice for more inclusion has been and still is the driving force for changes in educational placements. Dutch studies show that parents with children with Down syndrome choose regular schools not only for ethical and social reasons, but also because they expect educational advantages (de Graaf, 1998; Pijl & Scheepstra, 1998; Poulisse, 2002). They assume that regular placement will lead to a better development of particularly language and academic skills.

The Netherlands has a dual system of integrated and segregated special education. Parents of children with disabilities like Down syndrome may opt for special or regular education. As regards Dutch special schools, according to de Graaf *et al.* (2014), these are characterized by small classes (12-14 students). Alongside a teacher, full time classroom assistance is employed. Some opportunities for physical and/or speech and language therapy during school hours are provided. In schools for students with severe learning difficulties (SLD), more focus is on practical and social skill acquisition than in regular education. Parents may also opt for regular placement. In the Netherlands, as special classrooms inside regular schools are very rare, this is almost always placement in a regular classroom with some extra support. Though parents may opt for regular placement, there is no clearly stated right to attend a regular school. As regards students with Down syndrome, during the time frame of this study, regular schools received an extra personal educational budget sufficient for hiring qualified extra teaching staff for about half a day each week in grade 1 and 2 (4 to 5 year olds), and twice this budget in grades 3 through 8 (6 to 12 year olds). Sometimes this is supplemented by money from the Dutch care system (de Graaf, 2014). However, since 2014, a new educational policy, so-called "Passend Onderwijs" (Fitting Education), has replaced the financial open-ended system of personal educational budgets with a regional fixed budget for all

students. The effect of this policy change for the support of students with disabilities in regular education has yet to be evaluated.

According to the 2006-questionnaire, regularly placed students with Down syndrome in our research had individual support for 9 hours a week on average. In the Netherlands, regular schools are free to decide in which way they use this extra support. It can be used for educational assistance inside the regular classroom during a part of the day and/or it can be used for some individual remedial teaching outside the classroom. As regards literacy instruction, many of the regularly placed students with Down syndrome participate in regular classroom instruction and regular reading activities to some extent, especially in the first years of literacy instruction. However, this is often supplemented by individual instruction by an educational assistant within the classroom or by a remedial teacher outside the classroom.

According to Buckley (2001), there are large individual differences in literacy progress among children with Down syndrome, but if receiving good teaching, their reading abilities are, on average, about two years behind their age in primary school. Buckley states that studies suggest that some 60% to 70% of individuals with Down syndrome can achieve functional levels of literacy by adult life. According to Colognon (2013), people with Down syndrome commonly have a relative strength in reading, but realizing this strength requires learning opportunities and appropriate expectations. Some students with Down syndrome can engage in reading alongside their peers in inclusive educational settings (Colognon, 2013).

In a recent systematic review of four decades of international research on the effects of regular versus special school placement specifically of students with Down syndrome, de Graaf, van Hove and Haveman (2012) conclude that these children learn more academic and language skills in regular education, even after the effect of selective placement (the more able children have more chance to be in regular classrooms) has been taken into account. However, most of this research has been cross-sectional. Studies with a follow-up allow the assessment of the relationships between variables over a time period, which can be helpful in sorting out issues of causality (Howitt & Cramer, 2007). In addition, these studies can shed light on the timing of the processes leading to differential outcomes.

There have been some longitudinal prospective studies on reading development in Down syndrome that have probed into the effects of regular versus special education, notably a large study on a birth cohort from the Manchester area by Turner, Alborz, and Gayle (2008), an earlier small UK-

study by Laws, Buckley, Bird, MacDonald, and Broadley (1995) and an earlier small Argentinian study of Yadarola (1996). Turner *et al.* followed up 71 young people with Down's syndrome. They were studied at the mean chronological age of 9 years at time 1, 14 at time 2 and 21 at time 3. The outcome measure was the 58-item Academic Attainments Index (AAI), with subscales for reading, writing, and numeracy. Predictors were many different child and family characteristics, derived from questionnaires and interviews from tutors, mothers, and fathers. A path analysis was used to investigate the relations between predictors and outcome. The model predicted 48% of the variance in time 3 outcome scores. Severity of intellectual impairment was by far the most significant predictor. However, main stream school attendance had a modest beneficial effect on AAI scores throughout the school career of the children, independently of level of intellectual disability. In the study of Laws *et al.* (1995), no differences between settings in language, memory and non-verbal cognitive development were found early in the school career of the children with Down syndrome at age 4-10 years. At age 8-14 however, 6 out of 7 regularly placed children and 1 out of 7 specially placed children had some reading abilities (on the British Ability Scales). Finally, Yadarola (1996), using teacher and parent questionnaires and interviews as well as classroom and recess observations, followed up 10 children with Down syndrome for a period of four years. In special schools, the transfer from teaching prerequisites to teaching reading, writing, and math was postponed. Children at age 9 and 10 had not yet been exposed to any instruction at all in reading, writing or math. In sharp contrast, in the regular schools, the onset of teaching these skills to children with Down syndrome was around the age of 5 or 6. None of the children with Down syndrome in special education learned to read or write during the four year period, whereas all five children in regular schools became literate and were able to build written sentences. So, in all three studies, regularly placed children with Down syndrome exceeded their specially placed counterparts in reading. In addition, the two UK-studies showed that children with Down syndrome learn more academics, including reading skills, in regular education, even after controlling for differences in general cognitive functioning and other relevant child and family characteristics, measured at an earlier age.

2. Aim

In the current follow-up study, we focus on the effect of school type on reading development in children with Down syndrome. Reading abilities were investigated at time 1 (2006) (t1) and time 2 (2010) (t2). The two UK-studies demonstrate that regular school placement stimulates reading development in Down syndrome. In our current study, we investigated whether this likewise holds true for the Dutch situation, even after the effect of selective placement has been taken into account. So, do children with Down syndrome acquire more reading skills in regular education because the children with more potential have a higher chance to be in regular education? Or, do they learn more academics because regular education is more stimulating?

Our first hypothesis is that the more years children were in regular education between 2006-2010, the higher their reading skills will be in 2010, and that this holds true after controlling for t1-reading scores, and moderators like calendar age, IQ, t1 scores on non-academic skills, parental educational level, and the extent to which parents worked at home on academics. This is tested by an ANCOVA, with reading scores in 2010 as dependent variable, number of years in regular education between 2006-2010 as independent (distinguishing three groups: 0 years; 0.5, 1.5 or 2.5 years; 3.5 or 4.5 years), and t1- reading scores and the other moderators as covariates.

Our second hypothesis is that this also holds true if we only include children still in regular school in 2006 in the ANCOVA. It can be argued that some of the 2006-modifying variables, including the t1-reading scores, might have been directly influenced themselves by a different school history in earlier years. This might lead to interpretation problems, which are circumvented by limiting our analysis to the children still in regular education at t1, as these children all will have had the same 100% regular school history up to 2006. As regards number of years in regular education between 2006-2010, two groups are distinguished in this analysis (i.e. less than 3.5 years versus 3.5 or 4.5 years).

All our analyses were done for children of all ages, and separately for younger (< 9 years in 2006) and older ones. As in 2006, the regularly placed children were on average much younger (mean 8.0 years, *SD* 2.2) than their specially placed counterparts (mean 9.4 years, *SD* 1.7), so taking all ages together in an analysis might obscure real differences between regularly and specially placed children, both in initial development and in developmental

change. Secondly, splitting the analyses by age can provide insights in the timing of the processes leading to differential outcomes. Thirdly, the dependent variable is a 20-item measure on reading skills. The highest possible score is 20. The average 2010 reading score for children ≥ 9 with 3.5 or 4.5 years in regular education between 2006 and 2010 is 17.9. Since children cannot score higher than 20, there might be a ceiling effect for the students who were older than 9 in 2006. This ceiling effect will not affect the analyses of the younger group.

There is some controversy over the best analysis methodology in observational follow-up studies (Fitzmaurice, Laird, & Ware, 2004; Senn, 2006; van Breukelen, 2006). Some authors (Fitzmaurice *et al.* 2004; van Breukelen, 2006) recommend using analysis of variance of change from baseline, and make a case against using analysis of covariance (ANCOVA) of the outcome with the baseline as covariate. However, others (Senn, 2006) argue that ANCOVA can provide unbiased estimates of treatment effects in observational studies and that it is not a necessary condition for groups to be equal at baseline. In contrast, van Breukelen states that, in this situation, analysis of variance of change from baseline may be better than ANCOVA, but running both methods may be even better. According to van Breukelen, if both methods lead to the same conclusion, differing only in effect size, that increases one's confidence in that conclusion. For that reason, we have run both types of analysis in our research.

Stepwise linear regression is a systematic procedure in which the variables that explain the distribution best are selected by performing multiple regressions a number of times. Variables that do not contribute significantly to a better prediction of the dependent are eliminated. Stepwise regression is helpful in exploring which pattern of variables influences the dependent. As an additional analysis to the ANCOVA's, we run stepwise regressions.

Secondly, in our analyses there might be a problem of endogeneity, notably reverse causality. One could argue that the child's level of reading itself also may determine whether the child is allowed to stay in regular education. It should be understood that this only yields an interpretation problem in our study if regularly placed children with similar scores on the modifiers, but lower reading scores, would be selectively transferred to special schools. In that case, the lower reading scores of these specially placed children later in their school career, even after controlling for the modifiers, might be the result of this selection process, instead of being accounted for by special schools being less stimulating. Whether such a

selective transfer process has occurred in the years before their special placement cannot be directly investigated in the children already in special school at t1. However, due to the longitudinal design of our study, it is possible to directly investigate the process of transfer in the group of children still in regular school at t1. As a second additional analysis, we run a stepwise regression in which we explore which pattern of the variables, including reading score at t1, accounts for the differences in number of years the regularly placed children (regularly placed at t1) were allowed to stay in regular school between 2006 and 2010? So, how does the selection process work?

3. Methods

3.1. Sample

In 2006, a stratified random sample of 160 parents with children with Down syndrome, attending school, from the years of birth 1993-2000 (10 boys and 10 girls from each year), were drawn from the database of the Dutch Down syndrome Foundation. They were requested to complete an extensive questionnaire (de Graaf, van Hove, & Haveman, 2013). The response rate was 76% (121 parents of 67 regularly and 54 specially placed children). In 2010, the 121 parents who in 2006 had filled in the extensive questionnaire, were requested to fill in a short questionnaire with questions on reading, intelligence quotient (IQ) and on school placement during the 4.5 year period. 115 out of these 121 parents still participated in 2010 (95%). IQ-scores were only available for 99 of the 115 children (86%). We excluded the 16 children whose IQ was unknown. Of the 99 children in our analysis, 42 were already in special school in 2006, the other 57 were in regular school in 2006. Of these 57, 34 were still in regular school in 2010, the other 23 had been transferred to special schools. However, some of them had been in special schools for almost the whole period whereas others only recently had been transferred. Of the 23 transferred children, 8 had been in regular schools for 3.5 years between 2006 and 2010, 4 for 2.5 years, 6 for 1.5 years and another 5 for 0.5 years.

3.2. Instruments

We decided to use the method of questionnaire, instead of direct measuring of development with tests. By using a questionnaire, we avoid

bringing parents in a situation in which they have to decide whether their child will participate in a test. From clinical experience, we know that many parents of children with Down syndrome feel an aversion towards their child being tested. It was expected that the choice for a questionnaire instead would make it possible to reach a relative large representative sample. For the same reason we decided to use parent questionnaires instead of teacher questionnaires, as we expected a much higher response in parents than in schools. However, we are aware of some disadvantages of parent questionnaires such as the subjectivity of data from parents about the child's development. In a pilot study (de Graaf, 2007), using the same questionnaire, a high correlation (.85-.96) was found for parents' and teachers' overall scores for the relevant different developmental areas in a sample of 18 cases. This finding supports the use of these overall scores being interpreted as an index for development.

3.2.1. 2006-questionnaire

In the 2006-study, questions were related to the child's gender, calendar age, school history (i.e. how many years has the child been in school and how many of these school years has the child been in a regular school), academic and non-academic skills, parental educational level, the extent to which parents worked on academics with their child at home, and the amount of academic instructional time at school. The results of a cross-sectional analysis of these data has been published in de Graaf *et al.* (2013).

In 2006, parental educational level was measured as: low, middle, high, high university. The extent parents worked at home on academics with their child was assessed on a 5-point scale. Parents were asked whether the statement "as parents, we work at home on academics with our child" for their situation was completely false (score = 1), false (score = 2), neither false nor true (score = 3), true (score = 4) or completely true (score = 5).We measured the skills in reading, writing, math, and language of the persons with Down syndrome with a questionnaire with questions about well-defined concrete skills (is your child able to do it or not?), arranged from easy skills to more advanced. We derived an overall score by counting up the "yes"-scores for each developmental area. Self-help skills were measured using 4 point scales, with answer categories reaching from cannot do it at all (score = 0), only with a lot of help (score = 1), with some/little help (score = 2) or totally independent (score = 3). In addition, we developed an "Index for global functioning". Global functioning was measured as an

overall score of 12 items with outcomes on 5 point scale questions about certain specific child characteristics. Two Dutch studies (Scheepstra, 1998; Poulisse, 2002) show that these specific items are linked to the success of initial placement of children with Down syndrome in regular education, and success of staying there in the course of time. This self-constructed index contained items like: the child is co-operative in most school situations; the child is able to work independently at school; the child is a relative highly educable child in comparison with other children with Down syndrome; the child can make its intentions clear to others; etc. Cronbach's Alpha of these instruments for the different developmental areas varied between .72 (language) and more than .9 (reading, writing and math). Appendix contains a copy of the measure for reading, language, self-help skills, and the index for global functioning. The questions relating to writing and math are not included, as these scales were not used in the current analysis.

The most recent IQ test score of the child was not included in the original 2006-questionnaire, but was asked to all included parents afterwards in a telephone interview. The Snijders-Oomen non-verbal intelligence test (Snijders-Oomen, Laros, Huijnen, & Tellegen, 1998), a Dutch well-validated IQ test, was used most (59%), followed by the Wechsler Intelligence Scale for Children (21%). There were no significant differences in the type of test used between children in special versus regular school, nor between children younger and older than 9 years.

3.2.2. 2010-questionnaire

In 2010, parents were asked how many years their child had been in school between 2006-2010 and how many years the child had been in regular education during this period. In this longitudinal study, our dependent variable is the child's skills on reading in 2010. We gathered the necessary information by means of a questionnaire with 20 items about well-defined specific skills measured on a dichotomous scale (is your child able to do it or not?) ranging from easy skills to more advanced. An overall score was derived by counting up the "yes"-scores. For reading, the items ranged from "the child can recognise a few sight words" to "the child can spell out short words of three letters" to "the child reads longer stories for pleasure". Number of items was 20, Cronbach's Alpha .95. The same measure was applied for investigating reading skills in both 2006 and 2010.

3.3. Procedure

We excluded 16 children whose IQ was unknown. In the 99 remaining questionnaires, there were no missing values in the dependent variable (reading skills in 2010) or in most of the independents. However, a few parents left out information on their educational level or skipped one question in the index for global functioning in the 2006-questionnaire. We corrected for the missing data during a telephone follow-up with the parents. ANCOVA's, as described in the introduction, were performed to test the hypotheses. Stepwise regressions were run to explore which pattern of variables best predict t2-reading scores. Finally, a stepwise regression was run to explore which pattern of variables best predict the number of years the regularly placed children (regularly placed at t1) were allowed to stay in regular school between 2006 and 2010.

4. Data analysis

Table 1 - *Differences between the children by years in regular education between 2006-2010*

Children < 9 years (in 2006)	**Years in regular education between 2006-2010**								
	0 (n=18)		**0.5, 1.5 or 2.5 (n=9)**		**3.5 or 4.5 (n=28)**		**Total (n=55)**		
	Mean	***SD***	**Mean**	***SD***	**Mean**	***SD***	**Mean**	***SD***	**Pearson *r* [1]**
2010 reading **	5.7	4.8	5.7	3.1	13.4	4.3	9.6	5.8	.63
2006 reading **	1.3	2.1	.6	.9	4.3	4.7	2.7	3.9	.36
Reading difference 2006-2010 **	4.3	3.7	5.1	2.9	9.1	3.6	6.9	4.2	.53
Age (in 2006) **	7.8	.8	6.6	1.2	6.7	1.3	7.1	1.2	-.39
IQ **	45.8	11.6	44.2	8.3	53.3	6.9	49.3	9.6	.37
Global functioning index	43.3	7.0	40.3	5.5	45.9	5.7	44.1	6.4	.21
Language	6.9	1.4	6.4	1.9	7.3	1.7	7.0	1.7	.13
Self-help skills	42.2	14.4	33.0	12.5	42.6	12.8	40.9	13.5	.04
Extent to which parents worked with their child on academics at home **	3.2	.9	3.3	.5	3.9	.9	3.6	.9	.36
Gender (male %) *	61.1		55.6		32.1		45.5		.27

Mothers' educational level (high school and university %)	38.9	33.3	53.6	45.5	.17
Fathers' educational level	38.9	55.6	57.1	50.9	.12

Children ≥ 9 years (in 2006)	**0 (n=24)**		**0.5, 1.5 or 2.5 (n=6)**		**3.5 or 4.5 (n=14)**		**Total (n=44)**		
	Mean	***SD***	**Mean**	***SD***	**Mean**	***SD***	**Mean**	***SD***	**Pearson *r***
2010 reading **	8.3	5.1	13.0	7.0	17.9	2.7	12.0	6.4	.69
2006 reading **	4.3	3.4	10.3	7.2	13.9	3.5	8.2	6.0	.74
Reading difference 2006-2010	4.0	4.3	2.7	2.9	4.0	3.0	3.8	3.7	-.02
Age (in 2006)	10.6	1.1	11.3	1.1	10.2	.9	10.6	1.1	-.15
IQ **	41.0	9.3	49.5	9.4	55.9	7.7	46.9	11.0	.62
Global functioning index **	44.7	5.5	51.0	6.4	51.4	3.2	47.7	5.9	.53
Language **	7.3	1.6	8.7	1.5	8.8	.9	7.9	1.6	.46
Self-help skills **	46.0	10.8	52.5	9.4	55.3	8.3	49.8	10.6	.41
Extent to which parents worked with their child on academics at home	3.2	.8	3.5	.8	3.8	1.2	3.4	1.0	.29
Gender	54.2		33.3		42.9		47.7		.11
Mothers' educational level	37.5		33.3		71.4		47.7		.29
Fathers' educational level	50.0		50.0		71.4		56.8		.25

Children 5-13 years (in 2006)	**0 (n=42)**		**0.5, 1.5 or 2.5 (n=15)**		**3.5 or 4.5 (n=42)**		**Total (n=99)**		
	Mean	***SD***	**Mean**	***SD***	**Mean**	***SD***	**Mean**	***SD***	**Pearson *r***
2010 reading **	7.2	5.1	8.6	6.1	14.9	4.4	10.7	6.1	.59
2006 reading **	3.0	3.2	4.5	6.6	7.5	6.3	5.1	5.6	.37
Reading difference 2006-2010 **	4.2	4.0	4.1	3.1	7.4	4.2	5.5	4.2	.36
Age (in 2006) **	9.4	1.7	8.5	2.7	7.9	2.0	8.6	2.1	-.34
IQ **	43.0	10.5	46.3	8.8	54.1	7.2	48.2	10.3	.50
Global functioning index **	44.1	6.2	44.6	7.8	47.7	5.6	45.7	6.4	.26

Language	7.1	1.5	7.3	2.1	7.8	1.7	7.4	1.7	.20
Self-help skills	44.4	12.4	40.8	14.8	46.9	12.9	44.9	13.0	.09
Extent to which parents worked with their child on academics at home **	3.2	.9	3.4	.6	3.9	1.0	3.5	.9	.34
Gender *	57.1		46.7		35.7		46.5		.20
Mothers' educational level *	38.1		33.3		59.5		46.5		.21
Fathers' educational level	45.2		53.3		61.9		53.5		.17

Note: 1:Pearson *r* , * and ** refer to the correlation between number of years in regular education between 2006-2010 (0; 0.5, 1.5 or 2.5; 3.5 or 4.5) and the specific variable under observation * $p < .05$, two-tailed; ** $p < .01$, two-tailed; ** IQ: intelligence quotient.

In Table 1, the reading scores in 2006 and 2010 (as numbers of items "yes"), and the modifying variables, are presented for three different groups: children already in special school in 2006; children who were in regular education for 0.5, 1.5, or 2.5 years between 2006 and 2010; and children who were in regular education for 3.5 or 4.5 years in this period. The correlation between t2-reading scores and the number of years in regular education between 2006-2010 appears to be much higher than the correlation between t1-reading scores and the number of years in regular education, suggesting that children who were in regular education for 3.5 or 4.5 years between 2006 and 2010 advanced more in reading skills than children who were there for a shorter time or not at all. This holds true for the students of all ages taken together, and for the students younger than 9 years in 2006.

However, Table 1 shows that there are also differences in the modifying variables between children who were 3.5 or 4.5 years in regular education in the period 2006 to 2010 and children who were there for a shorter time or not at all.

3.4. ANCOVA's

To test whether the number of years in regular education has a real influence on reading development we performed an ANCOVA, with reading scores in 2010 as dependent variable, number of years in regular education between 2006-2010 as independent (distinguishing three groups: 0 years; 0.5, 1.5 or 2.5 years; 3.5 or 4.5 years), and t1-reading scores and the other

moderators as covariates. In Table 2A, the results are presented. It demonstrates that the more years the students were in regular education between 2006-2010, the higher their reading scores were in 2010, controlling for 2006 reading scores and the other moderators. This holds true for the students of all ages taken together, and for the students younger than 9 years in 2006, but not for the students aged 9 years or older in 2006.

In Table 2B, as an alternative approach, we present a similar analysis predicting change scores (and not using the reading t1-score as a covariate). This analysis corroborates the conclusion that regular school placement has a positive effect on reading development. However, this could only be demonstrated in the children younger than 9 years in 2006.

Table 2A - *ANCOVA with 2010 reading scores as dependent (and 2006 reading scores as covariate) - all children*

Children < 9 years (in 2006)	**Type III Sum of Squares**	***Df***	**Mean Square**	***F***	***p***	**Partial Eta Squared**
Corrected Model **	1323.75	12	110.31	9.84	≤ .001	.738
Intercept	17.10	1	17.10	1.53	.22	.035
2006 reading	20.14	1	20.14	1.80	.19	.041
Age (in 2010)	7.52	1	7.52	.67	.42	.016
IQ	11.41	1	11.41	1.02	.32	.024
Global functioning index	.21	1	.21	.02	.89	≤ .0001
Language	8.63	1	8.63	.77	.39	.018
Self-help skills	14.79	1	14.79	1.32	.26	.030
Extent to which parents worked with their child on academics at home	5.29	1	5.29	.47	.50	.011
Gender	.27	1	.27	.02	.88	.001
Mothers' educational level	.09	1	.09	.01	.93	≤ .0001
Fathers' educational level	22.29	1	22.29	1.99	.17	.045
Years in regular education between 2006-2010 (0; 0.5-2.5; 3.5-4.5) **	193.76	2	96.88	8.64	≤ .001	.291
Error	471.09	42	11.22			
Total	6873.25	55				
Corrected Total	1794.85	54				

Children ≥ 9 years (in 2006)	**Type III Sum of Squares**	***Df***	**Mean Square**	***F***	***p***	**Partial Eta Squared**
Corrected Model **	1439.32	12	119.94	11.27	≤ .001	.814
Intercept	.13	1	.13	.01	.91	≤ .0001
2006 reading **	187.06	1	187.06	17.58	≤ .001	.362
Age (in 2010)	20.33	1	20.33	1.91	.18	.058
IQ	35.61	1	35.61	3.35	.08	.097
Global functioning index	38.98	1	38.98	3.66	.07	.106
Language	.34	1	.34	.03	.86	.001
Self-help skills	3.26	1	3.26	.31	.58	.010
Extent to which parents worked with their child on academics at home	3.17	1	3.17	.30	.59	.010
Gender	9.84	1	9.84	.92	.34	.029
Mothers' educational level	.00	1	.00	≤ .001	.99	≤ .0001
Fathers' educational level	4.90	1	4.90	.46	.50	.015
Years in regular education between 2006-2010 (0; 0.5-2.5; 3.5-4.5)	6.89	2	3.44	.32	.73	.020
Error	329.92	31	10.64			
Total	8093.25	44				
Corrected Total	1769.24	43				
Children 5-13 years (in 2006)	**Type III Sum of Squares**	***Df***	**Mean Square**	***F***	***p***	**Partial Eta Squared**
Corrected Model **	2746.93	12	228.91	20.60	≤ .001	.742
Intercept	8.74	1	8.74	.79	.38	.009
2006 reading **	180.24	1	180.24	16.22	≤ .001	.159
Age (in 2010)	2.69	1	2.69	.24	.62	.003
IQ	35.08	1	35.08	3.16	.08	.035
Global functioning index	20.17	1	20.17	1.82	.18	.021
Language	20.73	1	20.73	1.87	.18	.021
Self-help skills	11.00	1	11.00	.99	.32	.011
Extent to which parents worked with their child on academics at home	3.50	1	3.50	.32	.58	.004
Gender	.50	1	.50	.05	.83	.001
Mothers' educational level	1.10	1	1.10	.10	.75	.001

Fathers' educational level	2.99	1	2.99	.27	.61	.003
Years in regular education between 2006-2010 (0; 0.5-2.5; 3.5-4.5) **	137.15	2	68.58	6.17	≤ .001	.126
Error	955.57	86	11.11			
Total	14966.50	99				
Corrected Total	3702.50	98				

* $p < 0.05$, two-tailed; ** $p < 0.01$, two-tailed; IQ: intelligence quotient.

Table 2B - *ANCOVA with change scores as dependent - all children*

Children < 9 years (in 2006)	**Type III Sum of Squares**	***Df***	**Mean Square**	***F***	***p***	**Partial Eta Squared**
Corrected Model **	338.71	11	30.79	2.21	.03	.362
Intercept	15.43	1	15.43	1.11	.30	.025
Age (in 2010)	15.59	1	15.59	1.12	.30	.025
IQ	.06	1	.06	≤ .001	.95	≤ .0001
Global functioning index	2.57	1	2.57	.19	.67	.004
Language	1.01	1	1.01	.07	.79	.002
Self-help skills	7.06	1	7.06	.51	.48	.012
Extent to which parents worked with their child on academics at home	4.70	1	4.70	.34	.56	.008
Gender	7.87	1	7.87	.57	.46	.013
Mothers' educational level	.54	1	.54	.04	.85	.001
Fathers' educational level	5.71	1	5.71	.41	.53	.009
Years in regular education between 2006-2010 (0; 0.5-2.5; 3.5-4.5) *	97.74	2	48.87	3.51	.04	.140
Error	597.99	43	13.91			
Total	3555.25	55				
Corrected Total	936.70	54				
Children ≥ 9 years (in 2006)	**Type III Sum of Squares**	***Df***	**Mean Square**	***F***	***p***	**Partial Eta Squared**
Corrected Model	220.26	11	20.02	1.73	.11	.372
Intercept	7.80	1	7.80	.67	.42	.021
Age (in 2010)	41.93	1	41.93	3.62	.07	.101
IQ	24.49	1	24.49	2.11	.16	.062

Global functioning index	36.50	1	36.50	3.15	.09	.090
Language	.94	1	.94	.08	.78	.003
Self-help skills	5.56	1	5.56	.48	.49	.015
Extent to which parents worked with their child on academics at home	13.30	1	13.30	1.15	.29	.035
Gender	28.97	1	28.97	2.50	.12	.072
Mothers' educational level	.97	1	.97	.08	.77	.003
Fathers' educational level	10.51	1	10.51	.91	.35	.028
Years in regular education between 2006-2010 (0; 0.5-2.5; 3.5-4.5)	48.07	2	24.03	2.07	.14	.115
Error	371.21	32	11.60			
Total	1236.75	44				
Corrected Total	591.47	43				

Children 5-13 years (in 2006)	**Type III Sum of Squares**	***Df***	**Mean Square**	***F***	***p***	**Partial Eta Squared**
Corrected Model **	559.02	11	50.82	3.69	≤ .001	.318
Intercept **	107.66	1	107.66	7.81	.01	.082
Age (in 2010) **	234.05	1	234.05	16.97	≤ .001	.163
IQ	3.45	1	3.45	.25	.62	.003
Global functioning index	14.74	1	14.74	1.07	.30	.012
Language	3.61	1	3.61	.26	.61	.003
Self-help skills	9.13	1	9.13	.66	.42	.008
Extent to which parents worked with their child on academics at home	4.17	1	4.17	.30	.58	.003
Gender	.37	1	.37	.03	.87	≤ .0001
Mothers' educational level	.08	1	.08	.01	.94	≤ .0001
Fathers' educational level	1.37	1	1.37	.10	.75	.001
Years in regular education between 2006-2010 (0; 0.5-2.5; 3.5-4.5)	32.84	2	16.42	1.19	.31	.027
Error	1199.60	87	13.79			
Total	4792.00	99				
Corrected Total	1758.63	98				

* $p < .05$, two-tailed; ** $p < .01$, two-tailed; IQ: intelligence quotient.

We performed a second ANCOVA, focussing on only the children still in regular school in 2006. If we limit the analysis to children still in regular education at t1, is there still a significant effect of the number of years the child was in regular education between 2006 (t1) and 2010 (t2) on their t2 reading scores, controlled for t1 reading scores, and controlling for the modifiers? As Table 3A shows, this is indeed the case, for all ages taken together and for the children younger than 9 years of age.

In Table 3B, again, we present a similar analysis predicting change scores (and not using the reading t1-score as a covariate). As regards the effect of regular school placement on reading development, this analysis shows a positive effect on reading development. However, this could only be demonstrated in the children younger than 9 years in 2006.

Table 3A - *ANCOVA with 2010 reading scores as dependent (and 2006 reading scores as covariate) - only children still in regular education in 2006*

Children < 9 years (in 2006)	**Type III Sum of Squares**	***Df***	**Mean Square**	***F***	***p***	**Partial Eta Squared**
Corrected Model **	702.14	11	63.83	5.61	≤ .001	.712
Intercept	1.33	1	1.33	.12	.74	.005
2006 reading	34.59	1	34.59	3.04	.09	.108
Age (in 2010)	5.94	1	5.94	.52	.48	.020
IQ	.03	1	.03	≤ .001	.96	≤ .0001
Global functioning index	.12	1	.12	.01	.92	≤ .0001
Language	2.38	1	2.38	.21	.65	.008
Self-help skills	1.34	1	1.34	.12	.73	.005
Extent to which parents worked with their child on academics at home	.18	1	.18	.02	.90	.001
Gender	3.92	1	3.92	.35	.56	.014
Mothers' educational level	1.45	1	1.45	.13	.72	.005
Fathers' educational level	5.96	1	5.96	.52	.48	.021
Years in regular education between 2006-2010 (0; 0.5-2.5; 3.5-4.5) **	111.96	1	111.96	9.84	≤ .001	.283
Error	284.33	25	11.37			
Total	5902.75	37				
Corrected Total	986.47	36				

Children ≥ 9 years (in 2006)	**Type III Sum of Squares**	***Df***	**Mean Square**	***F***	***p***	**Partial Eta Squared**
Corrected Model *	366.20	11	33.29	3.54	.04	.830
Intercept	2.75	1	2.75	.29	.60	.035
2006 reading	10.02	1	10.02	1.07	.33	.118
Age (in 2010)	.07	1	.07	.01	.94	.001
IQ	12.61	1	12.61	1.34	.28	.143
Global functioning index	1.14	1	1.14	.12	.74	.015
Language	5.70	1	5.70	.61	.46	.070
Self-help skills	.00	1	.00	≤ .001	1.00	≤ .0001
Extent to which parents worked with their child on academics at home	.38	1	.38	.04	.85	.005
Gender	.85	1	.85	.09	.77	.011
Mothers' educational level	6.54	1	6.54	.70	.43	.080
Fathers' educational level	12.34	1	12.34	1.31	.29	.141
Years in regular education between 2006-2010 (0; 0.5-2.5; 3.5-4.5)	4.31	1	4.31	.46	.52	.054
Error	75.25	8	9.41			
Total	5853.50	20				
Corrected Total	441.45	19				

Children 5-13 years (in 2006)	**Type III Sum of Squares**	***Df***	**Mean Square**	***F***	***p***	**Partial Eta Squared**
Corrected Model **	1326.34	11	120.58	13.04	≤ .001	.761
Intercept	1.93	1	1.93	.21	.65	.005
2006 reading **	87.44	1	87.44	9.45	≤ .001	.174
Age (in 2010)	.32	1	.32	.04	.85	.001
IQ	9.98	1	9.98	1.08	.30	.023
Global functioning index	1.85	1	1.85	.20	.66	.004
Language	14.57	1	14.57	1.58	.22	.034
Self-help skills	.02	1	.02	≤ .001	.97	≤ .0001
Extent to which parents worked with their child on academics at home	2.54	1	2.54	.27	.60	.006
Gender	7.15	1	7.15	.77	.38	.017
Mothers' educational level	8.54	1	8.54	.92	.34	.020

Fathers' educational level	2.66	1	2.66	.29	.60	.006
Years in regular education between 2006-2010 (0; 0.5-2.5; 3.5-4.5) **	86.18	1	86.18	9.32	≤ .001	.172
Error	416.22	45	9.25			
Total	11756.25	57				
Corrected Total	1742.56	56				

* $p < .05$, two-tailed; ** $p < .01$, two-tailed; IQ: intelligence quotient.

Table 3B - *ANCOVA with change scores as dependent - only children still in regular education in 2006*

Children < 9 years (in 2006)	**Type III Sum of Squares**	***Df***	**Mean Square**	***F***	***p***	**Partial Eta Squared**
Corrected Model	174.70	10	17.47	1.28	.29	.330
Intercept	33.57	1	33.57	2.46	.13	.087
Age (in 2010)	7.15	1	7.15	.53	.48	.020
IQ	4.44	1	4.44	.33	.57	.012
Global functioning index	.30	1	.30	.02	.88	.001
Language	.63	1	.63	.05	.83	.002
Self-help skills	.02	1	.02	≤ .001	.97	≤ .0001
Extent to which parents worked with their child on academics at home	7.58	1	7.58	.56	.46	.021
Gender	22.04	1	22.04	1.62	.22	.059
Mothers' educational level	.71	1	.71	.05	.82	.002
Fathers' educational level	.10	1	.10	.01	.93	≤ .0001
Years in regular education between 2006-2010 (0; 0.5-2.5; 3.5-4.5) *	77.05	1	77.05	5.66	.03	.179
Error	354.23	26	13.62			
Total	2985.75	37				
Corrected Total	528.93	36				

Children ≥ 9 years (in 2006)	**Type III Sum of Squares**	***Df***	**Mean Square**	***F***	***p***	**Partial Eta Squared**
Corrected Model	64.08	10	6.41	.56	.81	.384
Intercept	6.81	1	6.81	.60	.46	.062
Age (in 2010)	.69	1	.69	.06	.81	.007
IQ	11.77	1	11.77	1.03	.34	.103
Global functioning index	1.62	1	1.62	.14	.72	.016
Language	.55	1	.55	.05	.83	.005
Self-help skills	2.12	1	2.12	.19	.68	.020
Extent to which parents worked with their child on academics at home	17.18	1	17.18	1.51	.25	.143
Gender	5.30	1	5.30	.46	.51	.049
Mothers' educational level	3.14	1	3.14	.28	.61	.030
Fathers' educational level	17.49	1	17.49	1.53	.25	.145
Years in regular education between 2006-2010 (0; 0.5-2.5; 3.5-4.5)	.01	1	.01	≤ .001	.98	≤ .0001
Error	102.72	9	11.41			
Total	426.00	20				
Corrected Total	166.80	19				
Children 5-13 years (in 2006)	**Type III Sum of Squares**	***Df***	**Mean Square**	***F***	***p***	**Partial Eta Squared**
Corrected Model **	396.47	10	39.65	3.21	≤ .001	.411
Intercept **	156.95	1	156.95	12.71	≤ .001	.217
Age (in 2010) **	98.08	1	98.08	7.95	.01	.147
IQ	.35	1	.35	.03	.87	.001
Global functioning index	1.47	1	1.47	.12	.73	.003
Language	7.67	1	7.67	.62	.44	.013
Self-help skills	.09	1	.09	.01	.93	≤ .0001
Extent to which parents worked with their child on academics at home	10.81	1	10.81	.88	.35	.019
Gender	9.75	1	9.75	.79	.38	.017
Mothers' educational level	4.96	1	4.96	.40	.53	.009
Fathers' educational level	13.06	1	13.06	1.06	.31	.022
Years in regular education between	38.44	1	38.44	3.11	.08	.063

2006-2010 (0; 0.5-2.5; 3.5-4.5)			
Error	567.87	46	12.35
Total	3411.75	57	
Corrected Total	964.34	56	

* $p < .05$, two-tailed; ** $p < .01$, two-tailed; IQ: intelligence quotient.

3.5. Stepwise linear regressions

In Table 4, the results of the stepwise regressions are presented. These reveal that, apart from the number of years the students were in regular education between 2006-2010, some of the other moderators appear to influence 2010 reading scores (controlled for 2006 reading scores) and/or change scores as well. In the younger age group, 2010 reading scores correlate with 2006 self-help skills. In predicting 2010 reading scores for students of all ages taken together and, separately for the older students, both IQ and the global functioning index are significant predictors, suggesting that cognitive functioning influences reading performance over time. In predicting change scores for the total group, the global functioning index is significant as well. In three of the regression predicting change scores (all students; older students; all students still in regular education in 2006), age is a significant negative predictor, suggesting that the largest reading progress is in younger children.

Table 4 - *Results of stepwise linear regressions predicting 2010 reading scores (with 2006 reading as covariate) or change scores (with 2006 reading excluded as covariate)*

Dependent	**Group**	**Age group**	***R* square model**	***F***	**Significant predictors (Beta; *p*)**
2010 reading	All	< 9	.694	48.6	2006 reading (.418; ≤ .0001); Number of regular years 2006-2010 (.484; ≤ .0001); Self-help skills (.195; .034)
2010 reading	All	≥ 9	.781	47.6	2006 reading (.517; ≤ .0001); IQ (.306; .003); Global functioning index (.202; .04)
2010 reading	All	All	.724	61.5	2006 reading (.463; ≤ .0001); Number of regular years 2006-2010 (.282; ≤ .0001); IQ (.184; .008); Global functioning index (.17; .014)
Change score	All	< 9	.317	24.6	Number of regular years 2006-2010 (.563; ≤ .0001)

Change score	All	≥ 9	.123	5.9	Age in 2010 (-.351; .02)
Change score	All	All	.266	17.4	Age in 2010 (-.546; ≤ .0001); Global functioning index (.296; .002)
2010 reading	Regular school in 2006	< 9	.660	33.0	2006 reading (.562; ≤ .0001); Number of regular years 2006-2010 (.439; ≤ .0001)
2010 reading	Regular school in 2006	≥ 9	.669	36.5	2006 reading (.818; ≤ .0001)
2010 reading	Regular school in 2006	All	.718	68.8	2006 reading (.697; ≤ .0001); Number of regular years 2006-2010 (.357; ≤ .0001)
Change score	Regular school in 2006	< 9	.231	10.5	Number of regular years 2006-2010 (.481; .003)
Change score	Regular school in 2006	≥ 9	-	-	No significant predictors
Change score	Regular school in 2006	All	.368	15.7	Number of regular years 2006-2010 (.310; .06); Age in 2010 (-.498; ≤ .0001)

Note: Stepwise regression (constant included in equation). Only significant predictors are reported.
IQ: intelligence quotient.

Finally, we explored the process of transfer. Which of the variables, including reading score at t1, accounts for the differences in number of years children still in regular education in 2006 were allowed to stay in regular school between 2006 and 2010? A bivariate analysis reveals that in this group the number of years in regular school between 2006 and 2010 significantly ($p < .05$) correlates with IQ ($r = .45$) and the Index for global functioning ($r = .27$). After controlling for IQ, there turn out to be no other statistically significant correlations between the number of years in regular education and the other moderators. In addition, in a stepwise regression, entering all variables, only IQ turned out to be significant (*R* square = .206; beta for IQ .454). So, children with a higher IQ had a higher chance to stay longer in regular education in the period 2006-2010. The other variables had no influence after controlling for IQ.

5. Discussion

In this study, regularly placed children with Down syndrome, at least those younger than 9 years at t1, acquired more reading skills in the period 2006-2010 than their specially placed counterparts. Of course, reading development is not a straight consequence of inclusive placement alone, but, as the stepwise regressions reveal, is also determined by other factors. Particularly cognitive functioning (IQ and index of global functioning) had a positive effect on t2 reading scores, corrected for t1 reading scores. In addition, age appears to be negative correlated with change scores, suggesting the largest reading progress is in younger children.

Nevertheless, ANCOVA's predicting 2010 reading scores demonstrated that the more advanced reading skills at t2 (controlled for t1 reading scores) of children that had been more years in regular education between t1 and t2, could not be accounted for by differences in cognitive functioning alone. This was the case for the total group and, even more strongly, for the children under 9 years of age. In contrast, above 9 years of age, children who spent extra years in regular education seem to advance at the same pace as children in special education. There is no significant effect of more years in regular school in this age group in the ANCOVA's, nor in the stepwise regressions. However, the initial reading scores of the older regularly placed children is on average much higher than that of their specially placed counterparts. So they now seem to advance at the same pace, but proceeding from a higher baseline and so at a much higher reading level. Yet, the positive effect of regular placement in this older age group might be underestimated in our study. The average 2010 reading score for children ≥9 with 3.5 or 4.5 years in regular education between 2006 and 2010 is 17.9. Since children cannot score higher than 20, there might be a ceiling effect for the students who were older than 9 in 2006. Consequently, this might lead to an underestimation of reading advancement in these older students who stayed longer in regular education between 2006 and 2010.

An additional analysis showed that of children in regular school in 2006, children with a higher IQ had more chance to be still in regular school in 2010, suggesting a process of selective transfer. The ANCOVA's indicated that after transfer from regular to special education the children advanced in reading skill acquisition at a slower pace than their counterparts still in regular school. Yet, this cannot be accounted for by differences in the modifying variables alone. Even after controlling for IQ-differences and for differences in the other modifiers, children (still in regular education at t1)

had higher t2-reading scores (controlled for t1-reading scores) if they had been more years in regular school between t1 and t2. This analysis proves that neither endogeneity (selective transfer on basis of reading scores) nor a possible differential influence of special school placement (before 2006) on the modifiers can account for the better reading advancement of children who had been more years in regular school between 2006 and 2010.

As regards the positive effect of regular school placement on the reading development of students with Down syndrome, the alternative approach of ANCOVA's predicting change scores (instead of t2-reading scores with t1-reading scores as covariate) confirms the positive effect on reading development, for both the group children in any type of school in 2006 and for those still in regular school in 2006. However, this effect could only be demonstrated in the children younger than 9 years in 2006.

For practical and ethical reasons, it is impossible to explore these questions by randomised trials. As a consequence, a limitation of our study and of any non-experimental study is the fact that not measured child or family characteristics which might differentiate regularly and specially placed children could perhaps also account for differences in reading development. However one would expect that if such variables, for instance behavioural child characteristics, have an effect on development, they would not have a specific effect on reading development alone, but on cognitive functioning, language and self-help skills as well, which are all variables already included in our model. Furthermore, our findings of differential outcomes of school placement on the development of academic skills in Down syndrome are in line with other studies. De Graaf *et al.* (2012) reviewed 14 studies related to the effect of school placement on academic skill development in Down syndrome. Four of these studies (i.e.: Casey, Jones, Kugler, & Watkins, 1988; Bochner & Pieterse, 1996; Laws, Byrne, & Buckley, 2000; Buckley, Bird, & Sacks, 2006) can be considered natural experiments in which school placement was not determined by child characteristics but by geographical area and/or generation. In these natural experiments, the regularly placed students with Down syndrome consequently outperformed their specially placed counterparts.

Another issue is differences in quality between regular schools. One can hypothesize that better regular schools might be more capable in educating a student with Down syndrome than regular schools with a lower quality of instruction and didactics. Perhaps regular schools of poor quality also transfer students with Down syndrome to special education more often. This would imply that in our study there might be a tendency to compare

relatively high quality regular schools with typical special schools. However, such a mechanism, though not impossible, is highly speculative. Secondly, even if this mechanism would be active, our study still shows that in regular schools that succeed in placement for a longer period, students with Down syndrome do better in reading skills than their counterparts in special education, even after differences in background variables (like cognitive functioning, non-academic skills, parental educational level and the extent to which parents worked at home on academics) are taken into account. At least, this shows that these particular regular schools are effectively stimulating the academic development of their students with Down syndrome.

A last methodological issue is whether the data on the child's development derived from questionnaires can be interpreted as more than subjective perceptions of parents. In a pilot study (de Graaf, 2007) parents' and teachers' overall scores for the different developmental areas had a high correlation. This is an argument in support of these overall scores being interpreted as an index for development. Secondly, a comparison between the 2006 reading scores of students who were between 9 and 13 years old in 2006 with the 2010 reading scores of students who were between 9 and 13 years old in 2010 reveals the same relation between calendar age and reading scores for both groups, i.e. no differences in mean score and an almost identical regression line in plotting reading scores to calendar age. This is also true if one makes the same comparison separately for students with a mainly special versus a mainly regular school career. This level of consistency over time can be seen as a support for the reliability of the assessments. Finally, studies that instead of or complementary to parent questionnaires assessed academic skills either using teacher questionnaires (i.e.: Lorenz, Sloper, & Cunningham, 1985; Sloper, Cunningham, Turner, & Knussen, 1990; Philps, 1992; Yadarola, 1996; Turner *et al*, 2008) or normative tests (i.e.: Casey, Jones, Kugler, & Watkins, 1988; Laws *et al.*, 1995; Laws *et al.*, 2000; Bochner, Outhred, & Pieterse, 2001) demonstrated similar advantages of regular placement for the academic skill development of students with Down syndrome.

As regards the beneficial effect of regular classroom placement on academic development, de Graaf (2014) mentions different mechanisms that might play a role:

- The regular classroom seems to be a richer language environment, with more challenging language being used by teaching staff (Dew-Hughes & Blandford, 1998).

- Peers in a regular classroom are behavioural examples using more complex language (Yadarola, 1996).
- In special schools, effective teaching time appears to be greatly reduced as a result of time spent on transport, physical care regimes, therapies, and slower-moving members of the group (Beadman, 1997; Dew-Hughes & Blandford, 1998).
- Regular teachers generally place more emphasis on academic skills (Lorenz *et al.,* 1985; Yadarola, 1998).
- Regular teachers have higher academic expectations of their students with Down syndrome (Beadman, 1997; Dew-Hughes & Blandford, 1998).
- In regular schools, children with Down syndrome on average spent between one and a half and twice as much time more time on academic learning than in special schools (de Graaf *et al.,* 2013).
- The transfer from teaching prerequisites to teaching reading, writing and math, seems to be unnecessarily postponed by their teachers in students with Down syndrome in special schools (Lorenz *et al*, 1985; Yadarola, 1998).
- Regularly placed students with Down syndrome receive more individual instruction time than their specially placed counterparts (Philps, 1992; de Graaf *et al*., 2013).

Our longitudinal study is in line with earlier studies as regards the advantages of regular school placement for the development of academic skills in students with Down syndrome. Our study supports the conclusion that, at least during the first years of primary school, reading development of children with Down syndrome is directly and strongly stimulated by going to a regular school.

This is a conclusion with clear practical implications. If we assume academic development is important for children with Down syndrome, we should strive for placement in regular education, of course with adequate support.

Since in the current Dutch situation regular placement for children with Down syndrome is rather selective, it is important to find out more about what type and amount of support at regular schools is adequate to make a regular career possible for more children with Down syndrome.

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APPENDIX

The questionnaire on global functioning, self-help skills, language, and reading.

Global functioning

(answering categories: completely false (1), false (2), neither false nor true (3), true (4), or completely true (5))

- The child is a quiet (non-impulsive) student
- The child is cooperative in most school situations
- The child is able to work independently at school
- The child is a relative highly educable child in comparison with other children with Down syndrome
- The child can make its intentions clear to others
- The child's speech is intelligible to many people
- The child is potty-trained (during daytimes, it makes clear that it wants to use the toilet instead of wetting its pants)
- The child doesn't run away (or rarely runs away) from the classroom to wander around in the school
- The child doesn't leave the playground (or rarely leaves the playground) without permission
- The child has good social interactions with peers in the classroom
- The child has good social interactions on the school playground
- The child is non-aggressive (or rarely aggressive) to peers

Self-help skills

(answering categories: cannot do it at all (0), only with a lot of help (1), with some/little help (2), or totally independent (3))

- The child can eat and drink
- The child can put on and take off clothes (without complicated fasteners)
- The child can close a coat with a zipper
- The child can make use of a toilet
- The child can blow its nose
- The child can cut a strip with a pair of scissors
- The child can tie its shoe laces

(answering categories: cannot do it at all (0), only with a lot of help (1), with some/little help and not unattended (2), or totally independent and unattended (3))

- The child can ride a bike in the neighbourhood for a distance of 500 meters using a bike without training wheels

Language

(answering categories: yes or no)

- The child can speak at least in one-word sentences
- The child speaks in sentences of at least two or three words most of the time
- The child often speaks in sentences of at least five words
- In addition to often speaking in sentences of five words or longer, the child at least sometimes uses complex sentences with subordinate clauses
- The child often speaks in complex sentences with subordinate clauses
- The child has an expressive vocabulary (words or approximations of words that the child uses spontaneously) of at least one word
- The child has an expressive vocabulary of at least 10 words
- The child has an expressive vocabulary of at least 20 words
- The child has an expressive vocabulary of at least 50 words
- The child has an expressive vocabulary of at least 100 words

Reading

(answering categories: yes or no)

- The child can recognise and name at least one reading word on sight
- The child can recognise and name at least 20 different reading words on sight
- The child can recognise and name at least a few letters
- The child can recognise and name all or almost all letters
- The child can read, by independently spelling out, short new words comprised of a consonant, a vowel, and a consonant (like: cat, pet, ball)
- The child can read monosyllable words with combinations of consonants (like: pr.., br...)
- The child can read words with more syllables
- The child is able to read stories, at least consisting of several short sentences
- The child reads for pleasure, at least stories consisting of several short sentences
- The child is able to read books with longer stories
- The child reads longer stories for pleasure
- The child can read at least AVI-1 books (written for children who have had 6 months of reading instruction, which in Dutch regular schools for most children without disabilities is after 6 months in the Dutch third grade, the grade for 6-year-old children)
- The child can read at least AVI-2 books (level typically reached at the end of the Dutch third grade)
- The child can read at least AVI-3 books (level typically reached after 3 months in the Dutch fourth grade)
- The child can read at least AVI-4 books (level typically reached in the middle of the Dutch fourth grade)
- The child can read at least AVI-5books (level typically reached at the end of the Dutch fourth grade)
- The child can read at least AVI-6 books (level typically reached after 3 months in the Dutch fifth grade)
- The child can read at least AVI-7 books (level typically reached in the middle of the Dutch fifth grade)
- The child can read at least AVI-8 books (level typically reached at the end of the Dutch fifth grade)
- The child can read at least AVI-9 books (level typically reached after 3 months in the Dutch sixth grade)