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The impact of learning difficulties and socioemotional and behavioural problems on transition to postsecondary education or work life in Finland: a five-year follow-up study

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ABSTRACT

Learning difficulties have been found to dilute the possibilities that young adults have in their educational careers. However, during the last few decades, education has become increasingly important for employment and overall life satisfaction. In the present study, we were interested in the effects of mathematical and reading difficulties and socioemotional and behavioural problems (measured at age 16) on three educational situations at age 21: delayed graduation from upper secondary education, short educational trajectory and not being engaged in education, employment or training (NEET). The participants ($N = 597$; 304 females, 293 males) were one age cohort of ninth graders in general education classes, who were followed for five years after completion of compulsory education. This time frame included two different transition phases: first, from comprehensive education to upper secondary education, and second, from upper secondary education to further studies or to working life. Structural equation modelling was used as analysis method. The findings show that mathematical and reading difficulties as well as socioemotional and behavioural problems had significant long-term effects on the participants' educational careers. New in part was that these learning difficulties seemed to have somewhat divergent emphases on the three investigated life situations: (1) mathematical difficulties, more strongly than reading difficulties, caused the students to attain lower levels of education, (2) mathematical difficulties and socioemotional problems predicted a student ending up in the NEET group and (3) reading difficulties and behavioural problems predicted delayed graduation from upper secondary education.

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educational career

Introduction

During the last few decades, education has become increasingly important in regard to employment and overall life satisfaction. This highlights the significance of school completion and its role in accessing postsecondary education (Madaus 2006) and

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avoiding unemployment, thus helping the youth avoid the risk of ending up amongst the 'outsiders', who are left out and for whom social institutions and services are out of reach. Youths with learning disabilities are at an even higher risk than their peers without learning disabilities to end up not engaged in education, employment or training (NEET), especially during times of economic recession (Henderson 2010), as is currently the case globally.

The main interest of this study was in determining how the participants' learning difficulties that were identified in ninth grade predicted their educational careers. Skills in mathematics and reading were measured using screening tests among ninth graders receiving general education, and the term 'difficulty' was used to represent a broader construct including learning difficulties ranging from mild to severe. The participants in this study had attended general education classes in inclusive settings during both their compulsory education and upper secondary education. During their compulsory education, approximately 50% of the participants with learning difficulties in mathematics and/or reading had received additional and/or special needs education support from part-time special education teachers in their own schools.

In mathematics, difficulties in acquiring fluent computational skills during the early grades of compulsory education culminate in difficulties in learning advanced mathematics (Mabbott and Bisanz 2008). Further, in reading, phonological difficulties lead to problems in reading fluency and accuracy which may narrow one's vocabulary and hamper the accumulation of background knowledge, thus easily impairing reading comprehension (Lyon, Shaywitz, and Shaywitz 2003). When examining gender differences in these skills, it seems that gender differences in mathematics seem to be related to academic self-confidence rather than mathematical skills. Academic self-confidence in turn relates to emotions, and girls tend to have more negative emotions about mathematics than boys do (Frenzel, Pekrun, and Goetz 2007). It is widely accepted that more boys than girls have reading difficulties in the early years of elementary school (e.g. Rutter et al. 2004), but the proportion of girls with reading difficulties increases in later elementary years. In particular, poor reading comprehension skills across genders are typically identified in the later elementary school years, with girls being identified as poor comprehenders more often than boys. (e.g. Adlof, Catts, and Lee 2010).

Poor literacy skills and mathematical difficulties can be connected with behavioural and emotional difficulties as well as with increased social anxiety (Auerbach et al. 2008; Snowling, Muter, and Carroll 2007). To describe disruptive behavioural problems, we use the term 'externalising problems', which includes two syndrome scales: aggressive behaviour and delinquency. These scales are usable for testing the long-term outcomes of these behaviour patterns (Achenbach 1991). The connection between reading and/or mathematical difficulties and externalising problems seems twofold: stress arising from reading and/or mathematical difficulties may cause students to experience more pressure in learning, which may, in turn, increase aggressive behaviour (Auerbach et al. 2008).

Social competence is described as the ability to achieve and maintain desired social outcomes and relationships with peers by being able to control one's emotions and actions, and it is needed for effective social interactions (Holopainen et al. 2012; Kaukiainen et al. 2005). The transition phase from adolescence to adulthood per se is challenging for nearly all adolescents, as it includes many person-centred life occurrences, e.g. puberty, search of

independence (McCollin and Obiakor 2010). Moreover, although reading and mathematical difficulties do not directly predict problems in psychological well-being or social competence (Holopainen et al. 2012), together with externalising problems they interrelate with social and emotional problems in many ways (Auerbach et al. 2008), potentially causing them to have a negative effect on an individual's well-being (Salmela-Aro, Savolainen, and Holopainen 2009).

Longitudinal studies on learning disabilities have shown that reading and mathematical difficulties (Maughan et al. 2009; McCloskey 2009), externalising problems (Sitlington and Neubert 2004) and low social competence – namely, weak prosocial skills and high antisocial behaviour (Lane and Carter 2006) – all have strong effects on the educational careers of youths and adults. Students who have reading and/or mathematical difficulties and externalising problems/low social competence may exhibit lower academic success throughout their education (Scanlon and Mellard 2002; Zimmermann et al. 2013), end up on a lower educational trajectory than those without learning difficulties (Savolainen et al. 2008), drop out more often, have lower rates of graduation (Siennick and Staff 2008) and fail to enrol in postsecondary education, which may also lead to a restricted employment history (Lane and Carter 2006).

In the case of co-occurrence, i.e. the overlapping of learning difficulties, the consequences are more severe than when compared to a single learning difficulty, since adolescents with overlapping mathematical and reading difficulties seem to have more generalised achievement difficulties than single-deficit groups (Dirks et al. 2008). Learning difficulties and emotional and behavioural problems very often intertwine, further undermining the well-being of adolescents with learning difficulties (Lin et al. 2013). Although having learning disabilities is a lifelong condition, it does not automatically lead to unsuccessful and unhealthy life (Goldberg et al. 2003). An adolescent's dropping out from education can be a conscious choice and a temporary phase; the continuation of studies may happen when one feels that the time is right for that (Goodlad 2007). The better the self-awareness of the strengths and weaknesses an individual with learning difficulties has, the better chances s/he has for success in life and the easier it is also to set realistic goals for one's educational career. Adolescents and young adults with learning difficulties need support services either on an ongoing basis throughout their lives or on as-needed basis (Goldberg et al. 2003). As Mann Koepke and Miller (2013) points put, in order to develop more effective educational support systems, we need to know more of the specific effects of different kinds of learning difficulties. Thus, it is important to study learning difficulties both in isolation and in co-occurring conditions to enhance researchers' and practitioners' understanding of learning difficulties and their consequences to one's educational career.

Research questions

In the present study, we were interested in the cumulative processes of mathematical and reading difficulties along with behavioural and socioemotional problems and low social competence. Moreover, we wanted to examine how these difficulties (measured at the age of 16 in inclusive education) would affect the participants' educational transitions into further studies or work at the age of 21 after upper secondary education. Accordingly, we posed the following research questions:

- (1) To what extent do mathematical and reading difficulties, externalising problems and low social competence predict and explain delayed graduation from upper secondary education, short educational trajectory and becoming a member of the NEET group?
- (2) What are the respective effects of socioeconomic status, gender and educational track on this prediction?

Method

The context of this study

In Finland, after completing the ninth grade, students apply for a place in the upper secondary school of their choice, either in vocational education (hereafter 'vocational track') or in upper secondary general education (hereafter 'academic track'). The academic track provides a general education and is considered more rigorous than the vocational track; it also generates qualification for further studies either at a university or at a polytechnic. Those following the vocational track achieve both vocational qualifications and eligibility for polytechnic education, and can subsequently become eligible to apply for university. For every programme on both the academic and vocational tracks, upper secondary education studies take a minimum of three years and a maximum of four years (Finnish National Board of Education 2015).

Participants

This study is part of the ongoing longitudinal research project, 'Staying on Track of Learning' (Holopainen and Savolainen 2006). In this project, one whole age cohort of adolescents ($N = 597$; 304 females, 293 males) was followed for five years. During the initial phase of this study in spring 2004, the participants were in the ninth grade (mean age 15.9 years) in general compulsory education classes in a medium-sized Finnish city. Special education classes were not included in this research project; thus, the distribution of intelligence can be presumed to fall in the normal range (from slightly below average up to gifted students). In line with the national figures (Statistics Finland 2005), the majority of the participants were Finnish speaking; only 1.2% ($n = 7$) had a different mother tongue. Consent to take part in the study was obtained from the participants' parents.

During the first stage of this study in 2004, 59.5% of the participants (67.8% of girls and 50.9% of boys) were on the academic track, whereas 40.5% (32.2% of girls and 49.1% of boys) were on the vocational track; 76% of the students with reading difficulties and 72% of those with mathematical difficulties were on the vocational track. Nationally in 2004, 54.1% of the students entered the academic track and 38.4% entered the vocational track (Statistics Finland 2008).

A missing information analysis (MVA) using SPSS (version 19) showed that missing information for all variables in this study was completely at random (Little's MCAR test: $\chi^2 = 315.65$, $df = 296$, $p = .207$). When data were missing completely at random (MCAR), pairwise deletion with categorical outcomes was used to handle the missing data (Muthén and Muthén 2012); as a result, 76 participants were excluded from the analysis.

Procedure

An annual questionnaire was used to gather data for this study. During the first stage of the research in 2004, when the participants were in the ninth grade, mathematical and reading skills were assessed. All testing was executed in groups at the students' schools by their Finnish language or part-time special education teachers (working with general education students), who were trained to conduct such testing. Absence from school on the testing day created sample size variations for the tests (see Table 1). The participants evaluated their own externalising problems in ninth grade and their social competence skills in eleventh grade. Information about their parents' educational backgrounds was also gathered from the participants to control the effect of socioeconomic status on the results of the present study.

Measures

Mathematics

Mathematical difficulties were assessed using the normative screening test, MAKEKO (skills in mathematics) (Ikäheimo, Putkonen, and Voutilainen 2002), which is both a screening and a normative test for a particular age group (Hautamäki and Kuusela 2004). For ninth graders, a borderline of concern for mathematical difficulties is 50% of the maximum score (Ikäheimo, Putkonen, and Voutilainen 2002). In the present study, 18.9% of the participants ($n = 121$) did not achieve that; thus, they belonged to the lowest 24% in mathematical skills.

MAKEKO consists of 100 very basic mathematical sub-problems in numeracy, arithmetic, algebra and geometry, and the test score represents the total number of tasks correctly calculated. For the present study, following Taipale (2009), three sum variables were created from mathematical sub-problems: arithmetic ($n = 487$; 246 females, 241 males), algebra ($n = 482$; 243 females, 239 males) and geometry ($n = 483$; 243 females, 240 males). The sub-problems concerning verbal mental arithmetic and number sense were excluded because they could not be classified merely as arithmetical, algebraic or geometric sub-problems. The reliability coefficient (Cronbach's alpha) was .644 for arithmetic, .868 for algebra and .737 for geometry; the first score indicates a moderate psychometric value, while the latter two are good.

Reading

Reading difficulties were assessed using a normative reading test for youths and adults (Holopainen et al. 2004). Word reading was assessed using two time-limited tests to measure word recognition, reading accuracy and fluency. The error-finding test ($n = 516$; 258 females, 258 males) comprised 100 words, each containing one spelling error, and the word-chain test ($n = 516$; 258 females, 258 males) comprised 100 words written in clusters of four words without spaces between them. The participants had three-and-a-half minutes to find these errors and mark them with a vertical line. The total number of correctly marked errors determined the test score. The reading comprehension test ($n = 527$; 263 girls, 264 boys) used a story called 'Dogs of the Village', written by a Finnish author. From the original four-page text, 52 words were changed into words that were contradictory in the context of the sentence, paragraph or larger text. The participants had to find and underline these contradictory

Table 1. Descriptive statistics and mean level education differences of study measures.

	Whole sample (N = 597)			Vocational track (n = 242)			Academic track (n = 355)			t	df	p	Cohen d
	n	M	SD	n	M	SD	n	M	SD				
Arithmetic ^a	487	7.40	4.74	182	10.40	4.64	305	5.61	3.81	11.77	324	.000	1.16
Algebra ^a	482	20.22	11.87	180	28.28	10.59	302	15.42	9.82	13.50	480	.000	1.27
Geometry ^a	483	5.07	3.46	180	6.79	3.55	303	4.05	2.97	8.70	326	.000	0.86
Error-finding ^a	516	33.89	21.41	190	43.77	20.23	326	28.13	19.94	8.55	514	.000	0.78
Word-chain ^a	516	29.44	17.10	190	36.59	18.21	326	25.27	14.94	7.26	336	.000	0.70
Reading comprehension ^b	527	14.49	9.19	196	19.50	10.54	331	11.53	6.73	9.51	290	.000	0.95
Externalising problems ^c	455	12.13	7.85	172	13.80	8.76	283	11.11	7.08	3.41	304	.001	0.35
Father's education	370	4.01	1.53	125	3.38	1.33	245	4.33	1.54	-6.15	285	.000	-0.65
Mother's education	391	4.22	1.49	129	3.63	1.37	262	4.51	1.46	-5.71	389	.000	-0.62
Low prosocial skills	411	0.22	0.42	155	0.26	0.44	256	0.20	0.40	1.94	1	.164	
High antisocial behaviour	414	0.23	0.42	155	0.26	0.44	259	0.22	0.42	0.78	1	.377	
Delayed graduation	590	0.20	0.40	236	0.33	0.47	354	0.12	0.32	41.88	1	.000	
Short educational track	375	0.38	0.49	112	0.74	0.44	263	0.23	0.42	87.60	1	.000	
NEET	373	0.13	0.33	110	0.25	0.44	263	0.07	0.26	23.41	1	.000	

^aVariables of mathematics and word reading were transformed into risk variables by mirroring the original sum variables.

^bDifficulties in reading comprehension variable was normalised by using logarithmic transformation within SPSS-program.

^cThe 'Externalising problems' variable was normalised by using inverse function.

words. An evaluation of the need for special education support is recommended for those whose test scores remain under 45 points for word reading and 21 points for reading comprehension. Ninety students (15.1%) in the present study scored under those limits. For the word reading tests, there was strong internal consistency, with Cronbach's alpha at .834. For the reading comprehension test, the internal consistency was strong, with Cronbach's alpha at .911.

Externalising problems

The Youth Self-Report Scale (YSR) (Achenbach 1991) is a self-report measure suitable for assessing the emotional and behavioural difficulties of adolescents aged 11–18 years. In the present study, a Finnish translation made by Professor Fredrik Almqvist (Manninen 2013) was used. The participants completed the whole scale, but for the purposes of this paper, only the two syndrome scales of the YSR focusing on externalising problems were included: delinquent behaviour (syndrome scale VII with 11 items, e.g. 'I lie or cheat') and aggressive behaviour (syndrome scale VIII with 19 items, e.g. 'I argue a lot'). Both of these syndrome scales were rated on a three-point scale (0 = *not true*, 1 = *somewhat/sometimes true*, 2 = *very true/very often true*), and the raw scores were used in the analysis, as is preferable (Achenbach 1991). The reliability of delinquent and aggressive behaviours was good, with Cronbach's alpha at .728 and .840, respectively.

Social competence

The participants' social competence was measured in autumn 2005, when they were in eleventh grade, using the Multisource Assessment of Children's Social Competence Scale (MASK) (Kaukiainen et al., 2005). MASK was developed with Finnish elementary school children and further validated with Finnish adolescents in secondary school (Holopainen, Lappalainen, and Savolainen 2007; Holopainen et al. 2012). The present study used participants' self-evaluations of their social competence.

MASK contains 15 items that include four sub-dimensions of social competence: cooperative skills, empathy, impulsivity and disruptiveness. For these sum variables, the internal consistency was good, with Cronbach's alpha at .795, .721, .849 and .758, respectively. The first two sub-dimensions of social competence assess the prosocial dimension, while the latter two assess the antisocial dimension of social competence (Holopainen et al. 2012). Following the manual for MASK (Kaukiainen et al. 2005), the 'low prosocial skills' variable (0 = *sufficient prosocial skills*, 1 = *low prosocial skills*) was formed to comprise weak cooperative skills and/or low empathy. The 'high antisocial behaviour' variable (0 = *low antisocial behaviour*, 1 = *high antisocial behaviour*) was formed to comprise high impulsivity and/or high disruptiveness.

Delayed graduation from upper secondary education

Information on graduation from upper secondary education (n = 590, 301 females, 289 males) was obtained from the 2007, 2008 and 2009 school registers. In the present study, graduation was considered delayed if the participant had not graduated *within four years* after completing compulsory education. The variable 'delayed graduation' was assigned two values: 0 = *graduated within the expected time*, 1 = *delayed graduation*. Of the 590 participants, 120 (63 females, 57 males) had not finished their studies within four years after completing compulsory education, and were defined as delayed gradulators. Of these 120 participants, 27.5% belonged to the lowest 12% in reading skills and 24.2% had fell below the cut-off score

on the mathematical test. Nationwide statistics from 2009 show, that 63% of students on the vocational track and nearly 80% on the academic track completed their studies within three-and-a-half years (Statistics Finland 2011).

Short educational track

Information on the continuation of studies after upper secondary education was gathered from the participants. They were asked about their situation in life in spring 2009, including whether or not they had continued their studies after upper secondary education. The variable 'short educational track' was assigned two values: 0 = *continued studies*, 1 = *short educational track*. Of the 375 participants (221 females, 154 males) who answered this query, 112 participants were from the vocational track and 263 were from the academic track. Of these participants, 38% ($n = 143$; 62 females, 81 males) had not continued their studies after upper secondary education; 12.4% belonged to the lowest 12% in reading skills and 23.8% had achieved less than the cut-off score on the mathematical skills test.

NEET

The above enquiry into the participants' life situation in spring 2009 also supplied information regarding the NEET status ($n = 373$; 220 females, 153 males). The time point for the evaluation of NEET status was five years after compulsory education. At that time, if the participant was NEET, he or she was considered inactive in educational or work career. The variable 'NEET' was assigned two values: 0 = *either in education, employment or training*, 1 = *not in education, employment or training*. Of 373 participants, 12.6% ($n = 47$; 18 females, 29 males) were included in the NEET group. Of these, 10.6% belonged to the lowest 12% in reading skills, and 25.5% had achieved less than the cut-off score on the mathematical skills test. Nationwide, the dropout rate has remained steady at 4% in the academic track for the past decade and at about 9% in the vocational track (Statistics Finland 2014).

Socio-economic status

Mother's and father's levels of professional education (391 mothers, 370 fathers) were used as indicators of socio-economic status. The measure had six categories (no professional education, short course-based vocational education, basic vocational education, vocational education based on matriculation diploma from academic track, higher vocational diploma from polytechnic education and tertiary education at university). The information concerning parents' educational backgrounds was gathered from the participants at the end of ninth grade.

Statistical methods

As a preliminary procedure, all variables were first transformed into variables expressing learning difficulty by subtracting the achieved scores from the maximum scores. Next, the skewed variables were normalised using transformation methods in SPSS (version 19.0): 'externalising problems' by square root transformation and 'reading comprehension' by logarithmic transformation. Finally, all variables were standardised.

The structural equation model (SEM) was estimated using weighted least square parameter (WLSMV) estimates in the Mplus (version 6.11) program (Muthén and Muthén 2012). First, a measurement model was created via confirmatory factor analysis as part of the SEM.

Drawing on Holopainen et al. (2004) and Savolainen et al. (2008), a factor named 'reading difficulties' was built as a second-order factor consisting of two indicators: a latent variable named 'word reading difficulties' (using the error-finding task and word-chain task as indicators) and an observed variable named 'reading comprehension'. The three sum variables of mathematical difficulties (arithmetic, algebra and geometry) were loaded on a factor named 'mathematical difficulties'. Second, the initial path model was built as per the literature presented in the introduction. During the modelling, the parameters suggested by the modification indices that were consistent with the underlying theories were added to the model. Finally, non-significant paths were fixed to zero according to their *t*- and *p*-values. A root mean square error of approximation (RMSEA) with a value below .06, a weighted root mean square residual (WRMR) with a value below .90, comparative fit index (CFI) and Tucker–Lewis index (TLI) with values above .95 were essential indices in determining a good model fit.

In the present study, differences in gender and educational track in the model parameters were examined using a multigroup analysis. Due to the estimation method (WLSMV), the multigroup analysis was conducted using the DIFFTEST option in the Mplus program (Muthén and Muthén 2012). In this study, the invariance of factor loadings across groups, the invariance of factor variances and the invariance of factor covariance were tested to demonstrate that the underlying latent variables were measured in the same way in both groups (Wang and Wang 2012). The multigroup analysis compared two nested models; the less restrictive H1 model was estimated and selected if the *p*-value of the DIFFTEST was non-significant. If the *p*-value of the restricted model was significant (<.05), the restriction worsened the model fit, and the model was not equal for both groups. In the present study, after the measurement invariance was performed, the path coefficients were first constrained to be equal for both groups and then set free, if so indicated by the modification indices.

Results

The descriptive statistics and the results of the independent sample *t*-tests for the mean-level educational trajectory differences are presented in Table 1. The results show that the students on the vocational track performed worse on all tests and had more externalising problems than the students on the academic track, but differences in social competence were not found between the academic and vocational track students. In addition, the students on the vocational track failed to graduate from upper secondary education within the expected time more often than the students on the academic track. Furthermore, more often than their peers, the vocational track students did not continue their studies after upper secondary education, and ended up in the NEET group. Moreover, their parents' educational backgrounds were significantly lower than the parents of the academic track students.

The correlations between the sum variables of mathematical difficulties and the variables of reading difficulties were slightly stronger for the academic track than for the vocational track (see Table 2). For the vocational track, the three outcome variables of educational situations correlated moderately with each other, while for the academic track, the correlation was moderate only between NEET and short educational trajectory.

First, a measurement model as described in the Statistical methods section was built. Second, in order to answer the first research question, a path model was created to investigate the extent to which reading and mathematical difficulties, externalising problems and low social competence would predict and explain delayed graduation from upper secondary



Table 2. Intercorrelations between the variables of the present study; vocational education (n = 242) in upper diagonal and upper secondary general school education (n = 355) in lower diagonal.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10. ^a	11. ^a	12. ^a	13. ^a	14. ^a
1. Arithmetic		0.60**	0.53**	0.19**	0.19**	0.22**	-0.07	-0.08	-0.09	0.04	0.00	-0.02	0.20	-0.03
2. Algebra	0.71**		0.62**	0.17**	-0.04	0.31**	0.12*	-0.11	-0.07	0.15	0.15	0.08	0.21	0.14
3. Geometry	0.56**	0.56**		0.07	-0.06	0.23**	0.04	-0.00	0.08	0.13	-0.03	-0.00	0.21	0.15
4. Error finding	0.35**	0.31**	0.25**		0.68**	0.37**	-0.05	0.03	-0.01	-0.03	0.05	0.03	0.14	-0.06
5. Word-chain	0.21**	0.15**	0.11*	0.72**		0.26**	-0.04	-0.01	-0.04	-0.11	0.06	0.07	0.06	-0.05
6. Reading comprehension	0.32**	0.22**	0.21**	0.40**	0.26**		0.06	0.05	0.06	0.14	0.18*	-0.00	0.12	0.16
7. Externalising behavior	0.03	0.11*	0.09	-0.06	-0.08	-0.01		0.03	0.12	-0.06	0.36**	0.12	0.15	0.07
8. Mother's education	-0.08	-0.00	0.04	-0.02	0.00	-0.06	-0.01		0.47**	-0.21	-0.18	-0.09	0.15	-0.05
9. Father's education	-0.26**	-0.14*	-0.15*	-0.07	-0.12	-0.10	-0.08	0.50**		0.06	-0.20	-0.11	-0.04	-0.03
10. Low prosocial skills ^a	-0.01	-0.07	0.02	0.09	0.08	0.03	0.08	0.03	-0.02		0.15	-0.01	-0.09	0.19
11. High antisocial behavior ^a	0.14*	0.09	0.06	0.02	0.03	0.06	0.27**	0.14	-0.05	0.13*		0.07	0.06	0.03
12. Delayed graduation ^a	0.13*	0.17*	0.12*	0.12*	0.07	0.19**	0.07	0.06	0.02	0.00	0.15*		-0.38**	-0.22**
13. Short ed. trajectory ^a	0.05	0.09	0.06	0.02	0.00	-0.03	0.05	-0.05	-0.19*	0.01	0.14	0.11		0.35**
14. NEET ^a	0.08	0.08	0.10	0.14*	0.12	0.01	0.16*	-0.21**	-0.13	0.20**	0.19**	-0.00	0.41**	

**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

^aSpearman's rho; variables are categorical.

education, short educational trajectory and membership in the NEET group. Surprisingly, the results suggest (see Figure 1) that reading and mathematical difficulties seem to have divergent and individual roles in predicting the three outcomes when placed into a shared, common model. Reading difficulties, along with externalising problems, predicted delayed graduation from upper secondary education, while mathematical difficulties predicted a short educational trajectory and, together with low prosocial skills, membership in the NEET group.

To answer the second research question, the effect of SES was controlled. Consequently, the mother's educational background had no significant effect on the student's educational career. Instead, the lower the father's educational background was, the more learning difficulties the student had in both reading and mathematics, and the more likely it was that he or she would not have graduated from upper secondary education in the expected time. The father's low educational background also affected the student's likelihood of not continuing his or her studies after upper secondary education and of ending up as a member of the NEET group (see Figure 1). In addition, the father's educational background had some indirect effects: via reading difficulties on delayed graduation (total indirect standardised coefficient = -0.11 , $t = -3.54$), via mathematical difficulties on short educational trajectory (total indirect standardised coefficient = -0.12 , $t = -4.01$) and on the NEET situation (total indirect standardised coefficient = -0.12 , $t = -3.41$).

Next, the non-significant paths were fixed at zero, and the effects of gender and educational track on the final model were controlled using multigroup analysis. First, the model was controlled to be equal for females and males; no gender differences were found, with the single exception that the correlation between mathematical difficulties and externalising problems was significant only among males ($\beta = 0.28$, $t = 3.43$). Second, the model was controlled to be equal for vocational and academic tracks; no differences were found between the two tracks.

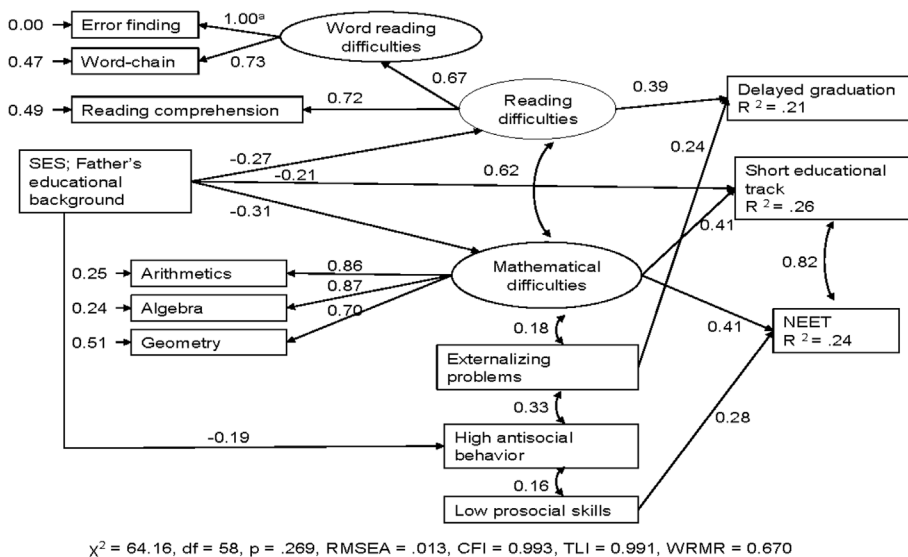


Figure 1. SEM model of reading and mathematical difficulties, externalising problems, low social competence and father's educational background explaining delayed graduation, short educational trajectory and NEET-situation; a. residual variance was fixed at .10.

This final model fitted the data well (see Figure 1); the indices of RMSEA, CFI, TLI and WRMR were all excellent at .013, .993, .991, and .670, respectively. The chi-square test also showed a good model fit ($\chi^2 = 64.16$, $df = 58$, $p = .269$), despite the relatively large sample size. On the whole, the model explained 21% of delayed graduation from upper secondary education, 26% of short educational trajectory and 24% of the likelihood of ending up in the NEET group.

Discussion

The main aim of this study was to examine the longitudinal effects of mathematical and reading difficulties, externalising problems and low social competence on three life situations for young adults: delayed graduation from postsecondary education, short educational trajectory and NEET. The findings indicate that reading and mathematical difficulties showed independent and divergent roles as predictors of the above educational situations when examined in a shared model. Externalising problems and low social competence also played an independent role in our prediction model, and these results are discussed in more detail below.

The findings suggest that reading and mathematical difficulties have divergent and independent roles as predictors of the three educational situations examined in this study. Mathematical difficulties, more strongly than reading difficulties, caused the students to attain lower levels of education. Parsons and Brynner (2005) also found that mathematical difficulties, more so than reading difficulties, negatively affect acquiring education. As McCloskey (2009) uncovered, poor calculation skills may hamper (young) adults' lives in many sectors; for example, skills in budgeting may be quite low and managing self-contained work or study assignments may be highly demanding. It is perhaps the case that mathematical difficulties dilute an adolescent's hopes and expectations for the future (Lackaye and Margalit 2008).

The shared role of mathematical difficulties and low prosocial skills in predicting membership in the NEET group was not surprising, as it has been shown that mathematical difficulties increase feelings of stress and burnout (Auerbach et al. 2008), which would clearly reduce psychological well-being in adolescents (Salmela-Aro, Savolainen, and Holopainen 2009). Indeed, students with mathematical difficulties and/or low prosocial skills may find coping difficult in many aspects of their lives. For that reason, they may end up having a restricted employment history (Lane and Carter 2006) and/or become members of the NEET group (Henderson 2010) more often than others, as was the case in the present study. On the other hand, it has to be kept in mind that the transition phase from compulsory education to upper secondary education and from there to further studies or working life is demanding, and may also be quite turbulent period of time because of many person-centred life occurrences as puberty (McCollin and Obiakor 2010). Young adults make different kinds of choices about their educational careers after completing compulsory education. These choices may include voluntary gap years from education, which may have positive effects on further education when an individual returns to education as 'a later learner' for example to gain better employment prospects (Gorard et al. 2001).

The shared role of reading difficulties and externalising problems as predictors of delayed graduation may result from a constant struggle with slow and laborious reading, which is clearly a stress factor in education. Encouragingly, students with these learning difficulties

seem to be able to finish their studies with good grades, though perhaps not in the expected timeframe (Undheim 2009), as was also the case in the present study. These results align with those of earlier studies on the connection between poor literacy skills and emotional and behavioural difficulties and their impact on adult life (Sitlington and Neubert 2004; Snowling, Muter, and Carroll 2007).

When controlling for the effect of the parents' educational backgrounds, it turned out that a father's low educational background directly predicted a short educational trajectory for his offspring. This result was in line with earlier studies on the father's role as a predictor of leaving school early (Lundetræ 2011). Earlier research showed that gender differences in reading skills (e.g. Adlof, Catts, and Lee 2010) or in mathematics (Royer and Walles 2009) were not significant among young adults, and thus the consequences for further education and adult life were most likely the same for both genders. Similarly, gender played no role in our prediction model.

Interestingly, despite differences in reading and mathematical skills, there were no differences in our model between vocational and academic track students. The academic track is considered more demanding than the vocational track, which essentially aims to build workforce skills and support lifelong learning (Finnish National Board of Education 2015). In the present study, most of the students who faced difficulties in reading and mathematics in ninth grade, enrolled in vocational education, thus aligning with earlier studies on the lower academic expectations of students with learning difficulties (Savolainen et al. 2008). However, nearly 30% of the students on the academic track had reading or mathematical difficulties; this suggests that on both educational tracks in this study, there were students with learning difficulties who must overcome many challenges in order to succeed in their studies. Unfortunately, the support system in Finland appears insufficient at the moment (Hakkarainen, Holopainen, and Savolainen 2015), and consequently, students with mathematical and/or reading difficulties are not receiving as much educational support as they would need. Obviously, more attention must be paid to improving transition planning and enhancing the success in learning outcomes in postsecondary education for students with disabilities, as Shaw and Dukes (2013) aptly pointed out.

Limitations

This study had at least four limitations that must be taken into account in any effort to generalise the results. First, although the sample size was relatively large, it comprised one age cohort from one medium-sized city in Finland. Second, the nature of the Finnish education system must be taken into account, and the results of this study should be compared only with those of studies conducted on similar education systems. Third, neither intelligence tests nor other cognitive tests (e.g. attention, memory) were carried out in this research. Although the participants in this study are from general compulsory education classes and the distribution of intelligence can be held normal (from slightly below average up to gifted students), the results of the study should be generalised with caution. Finally, the results should be generalised with caution because this study used self-report assessments (e.g. externalising problems, social competence, SES), and no complementary evaluation from teachers or parents was included.

Conclusion and practical implications

The results of this study clarify the divergent roles of mathematical and reading difficulties in predicting the educational careers of young adults. Our results over two educational transitions highlight the importance of ensuring well-planned and streamlined individual support and intervention practices for students with learning difficulties in inclusive education. These practices need to be available throughout the individual's educational career in order to avoid the unfavourable cumulative effects (aka Matthew Effect) of different kinds of learning difficulties and their far-reaching consequences.

Disclosure statement

No potential conflict of interest was reported by the authors.

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