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# Educational attainment of Swedish upper secondary students with and without reading difficulties

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## Abstract

This study examined the educational attainment of 139 upper secondary school students in Sweden. More specifically, the aim was to explore the educational attainment of upper secondary students with reading difficulties ( $n = 49$ ) or with typical reading ( $n = 90$ ) who had studied Swedish in year 1 (study background 1, SB1) or years 1 and 2 (study background 2, SB2) respectively. After screening for word recognition and reading comprehension, students were divided into two reader subgroups: students with reading difficulties (RD, i.e., poor word recognition and/or poor reading comprehension) and students with typical reading (TR). A chi-square test was performed to explore the proportion of low attainment (F-, E- and D-marks) and high attainment (C-, B- and A-marks) in the foundation subjects Swedish, English, social science, and history. Results showed that students with reading difficulties had lower educational attainment, and especially the SB1-group with RD seemed vulnerable. No significant differences in educational attainment between TR and RD in the SB2-group were observed. Results highlight the need for reading instruction across school subjects, as well as special education support, in upper secondary school.

## Introduction<sup>1</sup>

In Sweden, 28% of all upper secondary students did not obtain a complete upper secondary school diploma in 2020 (SNAE, 2020). Failure to reach the knowledge requirements of school subjects might lead to educational, professional, and participatory limitations (Holen et al., 2020). The gap between low- and high-achieving students increases throughout the school years, partly due to learning difficulties (Deshler et al., 2009). Historically, factors related to intelligence were the prime interest of researchers looking into school results, but over the past

few decades, greater attention has been paid to recurring additional factors such as motivation, attention, school characteristics, gender, and socio-economic status (SES) (Gil et al., 2019; Hattie, 2009; Johnson et al., 2010; Robison et al., 2017). Moreover, both international and national studies have shown that reading ability is an important factor for educational attainment (Bigozzi et al., 2017; Conti-Ramsden et al., 2009; Dockrell et al., 2011; Nordström et al., 2016; OECD, 2000; Reschly, 2010), and that reading difficulties might mean a greater risk of lower school marks and educational failure (Cain & Oakhill, 2006; Fouganthine, 2012; Hakkarainen et al., 2015; Holopainen et al., 2017; Levlin et al., 2022; Ricketts et al., 2014; Smart et al., 2017). However, studies point in different directions when it comes to the extent to which reading difficulties affect educational attainment in compulsory secondary school, and very little is known about this at the level of voluntary upper secondary school. Importantly, the school leaving marks of these students are critical as they are used for university entrance and professional purposes.

This investigation explores differences in attainment levels in foundation subjects, including language subjects (Swedish and English), social science, and history, with respect to students with and without reading difficulties. The exploration also takes into consideration whether the students had studied Swedish and English one or two years in upper secondary school.

### **Reading Difficulties and Educational Attainment**

From a historical point of view, there has been surprisingly little research on examinations and marks in Sweden, even though they constitute important parts of students' everyday school context and are used as selection criteria for further studies and professions (Lundahl, 2017). This study connects educational attainment to reading, which is a crucial tool for learning in school, and both word recognition (Nordström et al., 2016) and reading comprehension (OECD, 2000) are predictors of school results in many subjects. According to the well-established framework of the simple view of reading, reading comprehension is viewed as the product of two components: word recognition (decoding) and oral language comprehension (linguistic comprehension) (Gough & Tunmer, 1986; Hoover & Gough, 1990; Tunmer & Greaney, 2010). Word recognition refers to the ability to identify and decode isolated words accurately and quickly (Lervåg & Melby-Lervåg, 2022). Oral language comprehension, originally termed as linguistic comprehension by Gough and Tunmer (1986), refers to listening comprehension, and relates to several levels of language: vocabulary, syntax, and

discourse (connected speech) (Tunmer & Greaney, 2010). In turn, these comprehension components influence reading comprehension, as they are essential in the process of constructing a coherent mental representation of the text (Lervåg & Melby-Lervåg, 2022; Van den Broek & Kendeou, 2022). Especially in earlier years, word recognition predicts variances in reading comprehension (Lervåg & Melby-Lervåg, 2022), whereas older students' reading comprehension is more influenced by oral language comprehension, as word recognition becomes more proficient (Language and Reading Research Consortium, 2015; Lervåg et al., 2018; Ricketts et al., 2020).

Reading difficulties are a common learning difficulty (Katusic et al., 2001; Snowling & Hulme, 2021), and students with reading difficulties (poor word recognition and/or poor reading comprehension) are a heterogeneous group, whose difficulties often persist during school years, and whose persistence may depend on whether decoding and/or reading comprehension is affected (e.g., see overview by Lervåg & Melby-Lervåg, 2022; Maughan et al., 2009). Reading difficulties move along a continuum, but if either word recognition or oral language comprehension is zero, reading comprehension will be zero (Gough & Tunmer, 1986). Students with specific word recognition difficulties have their strength in good oral language comprehension, whereas they have poor word recognition due to weaknesses in phonological processing (Melby-Lervåg et al., 2012), which may lead to effortful reading and less text exposure (Naucmér & Magnusson, 2000; Sumner & Connelly, 2020). In contrast, students with specific comprehension difficulties have their strength in adequate word recognition, but they have challenges with reading comprehension owing to poor oral comprehension (linguistic comprehension) in such areas of the language as vocabulary (words, semantics), syntax (sentences, grammatical processing), and discourse (connected language) (Cain, 2022; Catts et al., 2006; Landi & Ryherd, 2017; Lervåg et al., 2018; Spencer & Wagner, 2018; Tunmer & Greaney, 2010). Differently put, weaknesses in vocabulary or syntax will compromise reading comprehension, as will, for example, poor inferencing (e.g., reading between the lines), which is a major constituent in comprehending discourse (Cain, 2022; Lervåg & Melby-Lervåg, 2022).

International studies on reading difficulties and educational attainment, many of which have been longitudinal with the last year in compulsory school (age 15–16) as the last assessment point, have revealed a somewhat patchy picture in terms of whether reading difficulties really affect educational attainment at the

end of secondary school. For instance, Bigozzi et al. (2017) found that word reading speed was a strong predictor of all school marks in all literacy-based subjects. In the same vein, Hakkarainen et al. (2013) reported that poor word recognition and poor comprehension, respectively, predicted Finnish ninth graders' educational attainment in several foundation subjects (Finnish, English, Swedish, math, biology, and history). In another Finnish study by Holopainen et al. (2017), ninth graders with poor word recognition performed on a level with controls with typical reading with regard to their mark in Finnish (L1), while the students with both poor word recognition and poor reading comprehension scored significantly below controls. British longitudinal studies have found that 8–11-year-old students with poor comprehension performed significantly worse in English than peers with age-adequate reading abilities, and that these differences had disappeared at age 16 (Cain & Oakhill, 2006; Ricketts et al., 2014).

In a Swedish context, the most comprehensive large-scale longitudinal study ( $N = 1,784$ ) so far was conducted by Nordström et al. (2016). It focused on the predictive power of word recognition in relation to subject marks that are necessary for the transition from compulsory school to voluntary upper secondary school, i.e., Swedish, social science and science. Early word recognition (Grade 2) predicted subject marks (Grade 9) the most strongly in academic subjects, e.g., Swedish, social science (including geography, history, religion, and civics), and science (including biology, physics, chemistry, and technology), and less strongly in non-literacy-based subjects (e.g., craft/sloyd and sports). According to Fouganthine (2012), Grade 9 students with word recognition difficulties and peers with oral language comprehension difficulties had equally low marks in Swedish at the end of compulsory school. However, the national assessment test (NAT) results in Swedish revealed that the oral language difficulties group scored significantly lower than peers with challenges in word recognition only. In a more recent study, Levlin et al. (2022) found that Swedish ninth graders with reading difficulties in primary school – regardless of whether they had word recognition or reading comprehension difficulties – had low attainment scores on NATs in Swedish at the end of secondary school. However, the authors point out that their findings indicate that individuals with reading comprehension difficulties face a slightly greater challenge than peers with word reading difficulties only. In conclusion, there are very few studies, and only two of them have focused on investigating how students with reading difficulties actually perform in terms of educational attainment. For example, Nordström and colleagues' (2016) study had a different focus. None of the

previous studies have followed up what reading difficulties imply at the level of upper secondary school, and all studies have identified reading difficulties in early school years, whereas none have examined what it looks like for students who have reading difficulties identified in upper secondary school.

Little is known about the connection between reading difficulties and attainment in L2 as a school subject. In Levlin and colleagues' (2022) study, the subgroup with word recognition difficulties was found to perform almost on a par with peers with typical reading in NAT scores in English at the end of secondary school. One possible explanation could be that there may not be an automatic transfer of L1 decoding difficulties to L2, especially when it comes to older students (Downey et al., 2000). For example, a subgroup of young Swedish adults with dyslexia preferred reading in English (L2) to reading in Swedish (L1), and they even had higher scores in English word reading than in Swedish (Miller-Guron & Lundberg, 2000). This phenomenon - referred to as dyslexic preference for English reading by the authors – may be explained by students with word recognition difficulties developing sight-word reading strategies in an L2 (English in this case) whose orthography is less transparent than that of the L1 (Swedish in this case) (van der Leij & Morfidi, 2006). However, the research picture is somewhat patchy, and some studies have found that L2 word recognition may be impacted by phonological processing difficulties in L1 (Bonifacci et al., 2017; Morfidi et al., 2007; Van der Leij & Morfidi, 2006). Furthermore, as pointed out by Levlin et al. (2022), differences in the outcome between studies may be explained by different research designs, e.g., differences in age, cut-offs etc. Moreover, Swedish students' frequent use of English outside of school may be another factor contributing to their performance in English (Holm et al., 2021; Waldmann et al., 2022).

Scholarship on the relationship between poor L1 reading comprehension and educational attainment in the school subject L2-English is scarce. In the aforementioned investigation by Levlin et al. (2022), it was discovered that especially the subgroup with poor reading comprehension was more likely to have lower scores than peers with typical reading or with word recognition difficulties. Also, the group with the combination of word recognition and reading comprehension difficulties was more likely to perform poorly in relation to their peers with typical reading or word recognition difficulties. Furthermore, Kormos' (2017) meta-analysis of the foreign language learning of students with specific learning difficulties (American Psychiatric Association, 2013) indicated

that these students may struggle with such aspects of foreign language as vocabulary growth, grammatical complexity, and word reading, which in turn may impact reading comprehension negatively. Lervåg and Aukrust (2010) found that L2 learners' reading comprehension grows more slowly than their L1 peers, and the authors partly explain this by an increase in differences in vocabulary knowledge. As reading comprehension is a major aspect in the assessment of the subject L2 English, it is plausible to assume that L1-Swedish reading comprehension difficulties will have a negative impact on the global mark for L2 English.

To conclude, past findings are not conclusive. On the one hand, some studies have indicated that students with poor word recognition (Holopainen et al., 2017) and students with poor reading comprehension (Cain & Oakhill, 2006; Ricketts et al., 2014) have performed on a par with peers with typical reading at the end of secondary school. On the other hand, some studies have demonstrated that reading difficulties – poor word recognition and/or poor reading comprehension – are associated with lower educational attainment in language subjects, e.g., L1-Swedish (Levlin et al., 2022), L1-Finnish (students with both word recognition and reading comprehension difficulties, Holopainen et al., 2017) and L2-English (students with reading comprehension difficulties, students with both word recognition and reading comprehension difficulties, Levlin et al., 2022 ). Thus, these results indicate that it is today unclear whether or not reading difficulties constitute a problem in later school years. Furthermore, a majority of studies have investigated educational attainment at the end of primary or secondary school, but no study has examined what it means to have reading difficulties in post-compulsory education as regards educational attainment. The demands on students' reading ability increase at this level of education, which in turn makes it urgent to investigate the extent to which reading difficulties affect educational attainment. Students' marks in foundation subjects are of interest as they are decisive in determining students' future educational and professional possibilities.

### **Current Study**

This investigation extends the existing body of literature by contributing with new knowledge about the educational attainment of students with reading difficulties at the level of Swedish upper secondary school. The aim of this study is to explore educational attainment in the foundation subjects Swedish, English, social science, and history, all of which put high demands on reading ability. These increased demands on students' reading ability call for the urgency to

investigate the educational attainment of upper secondary students with reading difficulties. The rationale for including students' upper secondary school leaving marks is that they have inclusive or exclusive effects on educational (e.g., university entrance) and professional options in future, and may also be seen as a representation of success in the school system (Nordström et al., 2016). Although there may be issues of objectivity and reliability, school marks can be seen as an ecological measure of educational outcome (Bigozzi et al., 2017).

In Sweden, school marks should be based on students' formative and summative performance (SNAE, 2011; Sundberg, 2021). After a course, students receive a mark based on their continuous, dynamic performance in the classroom, assignments, and exams (oral or written), including National Assessments Tests (NAT) scores. Starting with the highest attainment level, marks and grade points are as follows: A = 20; B = 17.5; C = 15; D = 12.5; E = 10 (lowest pass grade); F = 0 (fail). Due to methodological issues concerning the irregular leap from 0 to 10, i.e., 0 (F), 10 (E), and 12.5 (D), it was decided to use categorical variables and non-parametric measures. Guided by the assumptions of the chi-square test for independence, the six categories were collapsed into a two-attainment-level design consisting of F, E, and D (low attainment, LA) and C, B, and A (high attainment, HA) facilitating a global LA/HA perspective of the proportion between the variables. The Swedish upper secondary school has several subjects that are compulsory for all students. They are referred to as foundation subjects: Swedish, English, social science, history, religion, science, mathematics and physical education. As this study focuses on students with reading difficulties, it is of interest to look into the attainment of these students in the language subjects Swedish and English in which reading constitutes a major factor in the assessment. The courses Swedish 1 and English 5 are studied by all upper secondary students in the first year. The courses Swedish 2 and English 6 are compulsory for all students attending higher education preparatory programs and for a small minority of vocational programs. Two more foundation subjects were included – social science and history – on the criteria that they have an academic character and that reading constitutes a major skill in relation to the subject included. Science and religion, which are also foundation subjects, were excluded for methodological issues of (ecological) validity and reliability. Although such subjects as mathematics and physical education could have been taken into consideration as reading plays an important role in these subjects too, reading is not as critical in these two subjects.

As both the time spent on studying a specific subject and the complexity of the course content may affect students' educational attainment, it was of interest for this study to include study background in the language subjects Swedish (L1) and English (L2) as variables. Study background 1 (SB1) refers to studying Swedish and English in year one only (less course time and lower complexity), i.e., courses Swedish 1 and English 5. Study background 2 (SB2) refers to studying Swedish and English in years one and two (more course time and greater complexity), i.e., courses Swedish 2 and English 6. Students with word recognition difficulties and/or reading comprehension difficulties were collapsed into one group referred to as students with reading difficulties (RD) whereas students without such difficulties belonged to the group with typical reading (TR). To my knowledge, no study has included these aspects of study background and reading difficulties in relation to educational attainment.

The research questions read as follows:

1. Are there differences in the proportion of low versus high attainment in Swedish and English between groups of students with typical reading versus students with reading difficulties, and with varying study backgrounds in language subjects?
2. Are there differences in the proportion of low versus high attainment in social science and history between groups of students with typical reading versus students with reading difficulties, and with varying study backgrounds in language subjects?

## **Method**

### **Participants**

Participants were recruited from the only upper secondary school located in a rural town in northern Sweden. The vast majority ( $n = 139$ ; 56 girls and 83 boys) of the school's second-year students ( $N = 159$ ) accepted the invitation to participate in the study. Participants attended vocational programs ( $n = 85$ ) or higher education preparatory programs ( $n = 55$ ). The distribution of students attending the two different study tracks in relation to their reading profile and study background, was as follows: In the group with one year of study background in language subjects, all students attended vocational programs. In

the group with two years of study background in language subjects, in vocational programs, there were 27 students with typical reading and 16 students with reading difficulties; in higher education preparatory programs, there were 41 students with typical reading and 14 students with reading difficulties. Swedish was their L1. No individual data on SES were collected. However, since there is only one upper secondary school in the municipality, the students' SES probably reflects the SES-level of the municipality. According to official statistics the municipality's unemployment rate is similar to that of the nation, and the annual median income is slightly below the national level, whereas the rate of citizens with a degree from post-upper-secondary education is about 10 % below the average of the nation (Ekonomifakta.se, 2021; Scb.se, 2021).

Students were screened for word recognition (Olofsson, 1998) and reading comprehension (Järpsten & Taube, 2018) in the spring semester of the second year of their three-year voluntary upper secondary school program. Means and SDs from the norm-referenced manual have been used when calculating z-scores. Based on the screening outcome, students were divided into two reader subgroups – students with typical reading (TR, word recognition and reading comprehension:  $z \geq -.59$ ) and students with reading difficulties (RD, word recognition and/or reading comprehension:  $z \leq -.6$ ). Although it would be of interest to treat poor word recognition and poor reading comprehension as two separate factors to see how each of them may associate with educational attainment, this procedure would have created statistical problems, violating the additional assumptions of the chi-square test, e.g., too few cases in cells (Gravetter et al., 2018; Pallant, 2020). Thus, the two categories were collapsed into one reading difficulty category.

In the Swedish upper secondary school, the number of years that students study Swedish and English is partly determined by the study program they attend. Higher education preparatory programs include a minimum of two years of Swedish and English. Most vocational programs include one year of Swedish and English, although some students may opt for a second year too. The courses Swedish 1 and English 5 are studied in year 1, whereas the courses Swedish 2 and English 6 are studied in the second year. Based on the time participants had studied Swedish (L1) and English (L2), they were divided into two study background levels. Study background 1 (SB1) involves studies of Swedish and English in year one only, and study background 2 (SB2) indicates studies of Swedish and English during years 1 and 2 in upper secondary school. In Table 1,

there is an overview of the participants in each reader subgroup, study background level and their reading scores in year 2.

**Table 1.** Means (z-scores) and Standard Deviations for Reading Measures in Swedish year 2

	Typical reading		Reading difficulties	
	SB1 n = 22	SB2 n = 68	SB1 n = 19	SB2 n = 30
	Mean (SD)		Mean (SD)	
Word recognition	.24 (.62)	.27 (.66)	-.95 (.65)	-.77 (.58)
Reading comprehension	.46 (.53)	.60 (.59)	-.36 (1.03)	-.15 (.91)

*Note.* SB1 = study background 1, Swedish and English in year 1 only; SB2 = study background 2, Swedish and English in years 1 and 2.

## Measures and Materials

### *Word Recognition and Reading Comprehension*

Word recognition was measured by both phonological and orthographic recognition (Olofsson, 1998). For the former, participants were asked to silently read triplets of pseudo-words and mark the word that sounded like a real word. For the latter, students silently read pairs of words which had one word with correct spelling and one pseudo-homophone of the target word. All correct answers (time limit, 2 min. for each aspect) were added into a composite score, which constituted the measure for word recognition. The internal validity for the composite score was .76 (Cronbach's alpha). As to reading comprehension (Järpsten & Taube, 2018), after reading three factual texts, students were asked to answer multiple-choice questions tapping literal and inferential content. Students had 35 minutes to do this task (maximum of 21 marks).

### Procedure

The investigation has conformed to the ethics guidelines of the Swedish Research Council (Stafström, 2017) and to the Swedish Act relating to research involving humans (SFS 2003:460). Before data collection, the principal and students of the school gave their consent to participate in the project, including letting the participating researchers collect subject marks. The screening procedure was carried out in students' classrooms. The conversion of word recognition and reading comprehension raw scores to standardized scores (z-scores) was based on the means and standard deviations in the manuals (Olofsson, 1998; Järpsten & Taube, 2018). The screening results constituted the basis for dividing students

into a group with typical reading and a group with reading difficulties (poor word recognition and/or poor reading comprehension). It could have been of interest to treat word recognition and reading comprehension separately, but that would have created statistical issues in terms of too few participants, especially regarding the RD-group (e.g., not meeting the statistical assumption of the chi-two test, five or more cases in each cell). Students' end-of-upper-secondary school marks were collected from the school with the help of school staff.

### **Data Analysis**

Non-parametric statistics were employed as the study's variables were categorical (reading profile, study background, and educational attainment). Therefore, the chi-square test was used for significance testing in terms of the proportion of students' low and high attainment. According to Field (2018), chi-square statistics test if two or more categorical variables are associated. The null hypothesis stipulates that there is no difference between the categorical variables. In relation to this study's data, the test stipulates that there is no difference in the proportion that has received low and high marks, respectively, in the four groups. So, more specifically, the chi-square test for independence (crosstabulation table) was employed to explore group differences in the proportion of low and high attainments in language subjects, Swedish and English (RQ1), and, similarly, in the foundation subjects, social science and history (RQ2), regarding students with different reading profiles and study background in language subjects. The basic assumption of independent observation was met, as were the additional assumptions regarding the lowest expected frequency. For effect size, Cramer's V was used as it is normally used for tabulations larger than 2 x 2 taking into consideration the degrees of freedom, and for three degrees of freedom, the following criteria were used: small = .06; medium = .17; large = .29 (Field, 2018; Gravetter et al., 2018). The phi coefficient was employed as it is normally utilised for 2 x 2 tables and for one degree of freedom, and Cohen's (1988) criteria were employed: small = .01; medium = .30; large = .50. The adjusted residual result works as a post-hoc test and identifies which group is different from the others. Values of more than 2.0 indicate significance.

### **Results**

Table 2 presents the distribution of marks in the foundation subjects Swedish 1, English 5, social science, and history for all students. Also, Swedish 2 and English 6 are included, but they only apply to students who have studied the two language

subjects in years one and two. Different from the division between low (F, E, D) and high attainment (C, B, A), which was used in the chi-square test, a separate column was created for F, which is a critical mark as it may lead to students not receiving their upper secondary school diploma, and, in turn, exclusion from university entrance etc.

**Table 2.** Distribution of Marks in the Courses Swedish 1, English 5, Swedish 2, English 6, Social Science 1, History 1 (Percentage in Brackets)

Courses	Mark			Total
	F	E D	C B A	
Swedish 1	1 (0.7)	85 (61.2)	53 (38.1)	139
English 5	5 (3.6)	57 (41.0)	77 (55.4)	139
Swedish 2	2 (2.1)	58 (60.4)	36 (37.5)	96
English 6	0 (0)	28 (35.4)	51 (64.6)	79
Social Science 1	9 (6.8)	90 (67.7)	34 (2.6)	133
History 1	11 (8.1)	68 (50.4)	56 (41.5)	135

One observation is that there were few Fs in the entire group as a whole, but they were unequally distributed. Six of the eight Fs (75%) in the language subjects were within the RD-group, who constituted about 35% of the sample. The RD-group was also overrepresented in the number of Fs in Social Science 1 (4/9) and History 1 (5/11) considering their smaller sample size.

### Group Differences in Low and High Attainments in Swedish and English

A chi-square test for independence was performed to explore differences in the proportion of low (LA = F-, E- and D-marks) and high (HA = C-, B- and A-marks) attainments in the language courses Swedish 1 and English 5 (year 1) and Swedish 2 and English 6 (year 2) with respect to the groups' different reading profiles and study backgrounds in language subjects. For effect size, Cramer's V was used for Swedish 1 and English 5, whereas Phi was employed for Swedish 2 and English 6. Table 3 presents the frequencies and percentages for each subgroup, and the results of the chi-square test.

**Table 3.** Results of the Chi-Square Test for Independence, i.e., Comparison between All Four Groups, Cross Tabulation: Marks in Language Subjects

Courses	SB1TR		Tot	SB1RD		Tot	SB2TR		Tot	SB2RD		Tot	$\chi^2$ Value	df	P	Cramer's V
	n (%)			n (%)			n (%)			n (%)						
	LA	HA		LA	HA		LA	HA		LA	HA					
Swedish 1 <i>n</i> = 139	18 (81.8)	4 (18.2)	22	17 (89.5)	2 (10.5)	19	31 (45.6)	37 (54.4)	68	20 (66.7)	10 (33.3)	30	17.8	3	.001	.358
Adjusted residual	2.1	-2.1		2.7	-2.7		-3.9	3.9		.6	-6					
English 5 <i>n</i> = 139	14 (63.6)	8 (36.4)	22	16 (84.2)	3 (15.8)	19	18 (26.5)	50 (73.5)	68	14 (46.7)	16 (53.3)	30	24.4	3	.001	.419
Adjusted residual	2.0	-2.0		3.7	-3.7		-4.4	4.4		.3	-3					
Swedish 2 <i>n</i> = 96							37 (56.1)	29 (43.9)	66	23 (76.7)	7 (23.3)	30	2.9	1	.088	Phi -.197
Adjusted residual							-1.9	1.9		1.9	-1.9					
English 6 <i>n</i> = 79							21 (35.6)	38 (64.4)	59	7 (35.0)	13 (65.0)	20	.001	1	1.00	Phi .005
Adjusted residual							0	0		0	0					

*Note.* SB1TR = study background 1 with typical reading; SB1RD = study background 1 with reading difficulties; SB2TR = study background 2 with typical reading; SB2RD = study background 2 with reading difficulties. For effect size, Cramer's V (appropriate for tables larger than 2 x 2) was used for Swedish 1 and English 5, whereas Phi was employed for Swedish 2 and English 6 (appropriate for 2 x 2).

Regarding RQ 1 about attainment in language subjects (see Table 3), the chi-square test for independence (with Cramer's V) indicated that there were significant differences in the proportion of LA and HA between groups (study background/reading profile) for Swedish 1,  $\chi^2(3, n = 139) = 17.82, p = .001$ , Cramer's V = .36, i.e., large effect size. The adjusted residual revealed that the cases in the LA-level were significantly larger than expected in relation to the null hypothesis test for both the SB1TR-group and the SB1RD-group. However, the SB2TR-group revealed a significantly larger number than expected in the HA-level, while the null expectancy hypothesis was confirmed for the SB2RD-group.

The same test also revealed significant differences in the proportion of LA and HA with respect to group belonging (study background/reading profile) and English 5,  $\chi^2(3, n = 139) = 24.39, p = .001$ , Cramer's V = .42 (large effect size). The adjusted residual showed that the LA-level was significantly larger than expected with respect to the null hypothesis test for the SB1RD-group, which was different from the SB1TR-group, whereas the SB2TR-group revealed a significantly larger HA-level. Again, the null hypothesis was confirmed for the SB2RD-group.

Concerning Swedish 2 and English 6, the above test (see Table 3) failed to detect any significant differences in the proportion of LA and HA-levels between the SB2TR-group and the SB2RD-group in either language course, albeit in Swedish 2, the latter group was close to a significantly larger proportion in LA.

### **Group Differences in Low and High Attainments in Social Science and History**

Concerning RQ 2 about the foundation subjects social science and history (see Table 4), a chi-square test for independence (with Cramer's V) showed significant differences in the proportion of LA and HA between groups (study background/reading ability) and the two courses Social Science 1,  $\chi^2(3, n = 133) = 20.3, p = .001$ , Cramer's V = .390 (large effect size), and History 1,  $\chi^2(3, n = 135) = 17.2, p = .001$ , Cramer's V = .357 (large effect size). The adjusted residual of the former revealed that the number of cases in the low attainment level of the SB1RD-group and the SB1TR-group were significantly larger than expected in relation to the null hypothesis of the test, indicating an overrepresentation in LA, and conversely, underrepresentation in the HA-level.

**Table 4.** Results of the Chi-Square Test for Independence, Cross Tabulation: Marks in Social Science 1 and History 1

Course	SB1TR			SB1RD			SB2TR			SB2RD			$\chi^2$ Value	df	P	Cramer's V
	n (%)		Tot	n (%)		Tot	n (%)		Tot	n (%)		Tot				
	LA	HA		LA	HA		LA	HA		LA	HA					
Social Science 1 n = 133	21 (95.5)	1 (4.5)	22	18 (100)	0 (0)	18	38 (58.5)	27 (41.5)	65	22 (78.6)	6 (21.4)	28	20.3	3	.001	.390
Adjusted residual	2.5	-2.5		2.7	-2.7		-4.1	4.1		.6	-.6					
History 1 n = 135	17 (77.3)	5 (22.7)	22	15 (93.8)	1 (6.3)	16	30 (44.1)	38 (55.9)	68	17 (58.6)	12 (41.4)	29	17.2	3	.001	.357
Adjusted residual	2.0	-2.0		3.0	-3.0		-3.4	3.4		.0	.0					

*Note.* SB1TR = study background 1 with typical reading; SB1RD = study background 1 with reading difficulties; SB2TR = study background 2 with typical reading; SB2RD = study background 2 with reading difficulties.

The SB2TR-group was the only one whose cases in the cell were significantly larger than expected in relation to the null hypothesis in the HA-level. As for the SB2RD-group, no significant association was observed.

With respect to History 1, the SB1RD-group's LA-level was significantly larger than expectancy, whereas the null hypothesis was confirmed for the SB1TR-group. Once again, the SB2TR-group's HA-level was significantly larger than expected, whereas no significant association was observed as regards the SB2RD-group.

## Discussion

This study investigated upper secondary students' educational achievement in four foundation subjects compulsory for all students, and more specifically the courses Swedish 1, English 5, Social Science 1, and History 1. Focus was on students with or without reading difficulties (RD) in different study background-groups (study background 1 = Swedish and English in year one only; study background 2 = Swedish and English in years one *and* two). Also, the courses Swedish 2 and English 6 were included for students in study background-level 2.

Regarding research question 1 about attainment in language subjects, there were significant differences between the groups in the proportion of low attainment (LA) and high attainment (HA) in Swedish 1 and English 5. The SB1RD-group was overrepresented in the LA-level in both Swedish 1 and English 5. Similarly, as revealed in Table 2, the overrepresentation of Fs in the RD-group in both language subjects Swedish/English also reveals this group's vulnerability in terms of low attainment which may exclude these students from proceeding to tertiary education. Despite a somewhat patchy research picture, these results are analogous to previous research, which has revealed that students with reading difficulties (poor word recognition and/or poor reading comprehension) may find language subjects such as Swedish and English challenging, and they are more likely to receive lower marks in these subjects in lower secondary school (Fouganthine, 2012; Levlin et al., 2022). This study suggests that this is also true for Swedish students with reading difficulties at upper secondary level. Aside from being specifically assessed in the form of reading comprehension, reading is a key component in acquiring knowledge in these two language subjects, so it is likely that reading difficulties affect these marks negatively. It is also reasonable to believe that SB1-students' lower level of course time and course complexity in

Swedish and English also played a role in their performance as research has shown that reading instruction programs have a large effect on students' educational outcome (Hattie, 2009).

The theory of cross-linguistic universality assumes that low reading ability in L1 will predict low reading ability in L2, and, for instance, it has been suggested that individuals who have difficulties with L1 phonological processing will also have L2 word recognition difficulties (Bonifacci et al., 2017; Morfidi et al., 2007; Van der Leij & Morfidi, 2006). However, there may not be any automaticity in the transfer of L1 word recognition difficulties to L2, especially with respect to older students, and depth of orthography impacts results (Downey et al., 2000; Miller-Guron & Lundberg, 2000; Seymour et al., 2003). For many students with word recognition difficulties, reading in English (L2) with a less transparent orthography may be more challenging than reading in Swedish (L1), whose orthography is more transparent, i.e., with greater grapheme-phoneme correspondence (Lundberg, 2002). Upper secondary students come across longer and phonetically more complex words than in earlier school years. As regards L2 reading comprehension, processing language in an L2 may constitute an extra cognitive strain on students with reading comprehension problems (Kormos, 2017). Many of these individuals have challenges with different levels and aspects of language, for instance, vocabulary, sentences (grammatical processing, cohesion), and discourse in L1, which in turn may tax reading comprehension in L2 and thus be obstacles to making inferences and to creating a coherent mental representation of the text (cf. Kintsch & Rawson, 2007). At this educational level, students are likely to encounter many more academic and abstract English words (Lundberg, 2002) and also more complex grammar. Thus, these aspects may partly explain the lower attainment of the SB1RD-group in English 5, but also study background may play an important role here, as we shall see below.

The SB1-group with typical reading (SB1TR-group) was also overrepresented in low attainment (LA) in Swedish 1, but not in English 5. The LA in Swedish for both groups with SB1 are in line with national statistics, which show that vocational students have lower educational attainment than students attending higher education preparatory programs with respect to upper secondary school completion (SNAE, 2017a) and students' upper secondary school leaving marks in Swedish 1 and English 5 (SNAE, 2017d). Also, NAT results in Swedish 1 and English 5 are of interest in this respect, as they specifically reveal scores in reading comprehension. In the 2017 NATs in Swedish 1 and English 5, vocational

students scored below their peers attending higher education preparatory programs both in terms of the sub-skill of reading comprehension (Swedish, English) and the composite score (SNAE, 2017b). To conclude, in support of the above statistics, it can be deduced that students' SB (vocational programs mostly in SB1) is at work here.

The SB2-group with TR had a significantly higher proportion of HA, and the SB2-group with RD had an expected distribution of HA and LA, i.e., the null hypothesis was not rejected. This may suggest that reading difficulties do not play an important role for the educational outcome in those cases when students study Swedish and English for two years. These findings are also congruous with past scholarship, which demonstrates that good levels of reading ability have a positive effect on educational attainment (Reschly, 2010). For instance, Bigozzi et al. (2017) found that reading skills predicted secondary school students' marks in L1 (Italian) and L2 (English). One can assume that choice of study programs plays a role here too, as NAT results in both Swedish 1 and English 5 reveal that higher education preparatory programs are more represented in HA-levels (SNAE, 2017b; SNAE, 2017c). As SES is a predictor of school outcome (Hattie, 2009) and students from higher education programs often come from higher SES backgrounds, it is reasonable to assume that the result could be related to SES backgrounds as well (albeit no individual data on SES are available in this study).

Concerning research question 2 about attainment in the courses Social Science 1 and History 1, a similar picture emerges in the sense that the SB1RD-group was overrepresented in LA in both subjects. As seen in Table 2, compared to the language subjects, there were more Fs in Social Science 1 and History 1, and the Fs were overrepresented in the RD-group – 4 out of 9 in Social Science 1 and 5 out of 11 in History 1 – considering this group's smaller sample size. Findings are consonant with the little research that exists. For instance, Nordström and colleagues' (2016) longitudinal study indicated that marks in academic subjects such as social science in lower secondary school, were strongly associated with early word recognition. It is likely that reading difficulties tax reading comprehension in academic subjects, for example, social science and history, as these subjects involve reading large pieces of texts with an academic vocabulary with abstract concepts and complex grammar and cohesion, which may constitute an obstacle. This investigation suggests that reading difficulties may play a role in educational attainment in social science and history also at the level of upper secondary school.

In the current study, however, the SB1TR-group was overrepresented in LA in Social Science 1 too, but not in History 1. Once again, this overrepresentation may be seen in light of students' choice of programs of study. At a national level, vocational students' school leaving marks in Social Science 1 are overrepresented in LA-levels (SNAE, 2017d).

As to the SB2TR-group, an overrepresentation in HA was observed in both Social Science 1 and History, and it is reasonable to assume that these students can use their typical reading skills as an effective tool for learning in these academic subjects with an emphasis on reading. Moreover, once again, for the SB2-group with RD, the null hypothesis was not rejected as it had an expected distribution of HA and LA. It may be that this group has benefitted from the more time they have had to develop their literacy skills. In addition, as the majority of this group attended higher education preparatory programs, the result may be related to SES background.

### **Limitations and further research**

Several limitations need to be mentioned. First, this study did not have any information on previous instructional context, including possible special education support. Thus, future studies should include these aspects to arrive at a more comprehensive picture. Second, as SES is an important predictor of educational attainment (Hattie, 2009), it would be of interest to include individual data on SES in similar studies with students with reading difficulties, as no such data were available in this study. Thus, the findings can only be generalized to areas of similar SES features, and results may be different in places with a different SES profile (e.g., university towns). Future studies would benefit from including more fine-grained statistical analyses, for example, a logistic regression, to control for more factors, for example SES and motivation. However, such data were not available, why such an analysis was not possible in this case. Third, it would have been useful to include word recognition and reading comprehension as separate variables in the analysis to achieve a deeper and richer understanding of how different aspects of reading ability relate to educational attainment. However, such a separation between word recognition and reading comprehension was not possible in the current study due to the limited sample. Thus, investigating this, which a larger sample may enable, would be another fruitful avenue for future research. A fourth limitation is the fact that the F-mark was included in the low-attainment group for statistical reasons, which may conceal the connotation of exclusion that this mark may have in the sense that it

may impeach students from receiving a school diploma, and, for example, from entering university. Although students with reading difficulties were overrepresented in the number of Fs (Table 2), it would be of interest to give more coherent form to the exploration of the critical F-mark in relation to students with reading difficulties in future studies.

## Conclusion

The findings of the study suggest that upper secondary students who study Swedish and English only in year 1 and who also attend vocational programs have a tendency to have lower marks in comparison with students who study Swedish and English in years 1 *and* 2 and whose vast majority attend higher education preparatory programs. An extra vulnerable group seems to be students with reading difficulties with SB1. However, reading difficulties do not seem to be very problematic for students with SB2. It is unclear what these differences may depend on, but one factor may be that these students have had more time to work with the reciprocal skills of reading and writing in L1 and L2. However, factors related to educational attainment are complex, and many factors may be at work in parallel, and there may be SES factors affecting the result etc. To conclude, the results highlight the need for reading instruction across school subjects and special education support as well in upper secondary school.

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