Role of linguistic and sociocultural diversity in reading literacy achievement: a multilevel approach

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This study examined how linguistic and sociocultural diversity have an impact on the reading literacy outcomes of a representative sample of 3,549 first-language (L1) and 208 second-language (L2) fourth-grade students in the Netherlands. A multilevel modelling analysis was conducted using Progress in International Reading Literacy Study 2006 data to explore to what extent linguistic background, socioeconomic status (SES), home and school literacy environment and reading attitudes explain differences in reading literacy achievement. Significant differences between L1 and L2 students were found with regard to reading literacy achievement, SES and the home and school literacy environment. Multilevel modelling analysis showed 34.7% of explained variance in reading literacy achievement, whereby the student level accounts for most of the explained variance. In the final model, linguistic background, SES, home and school literacy environment and reading attitudes were found to have a significant effect on reading literacy achievement.

Reading literacy is one of the most important skills that children develop during primary school. It is an important predictor of later school success and necessary to participate in society. In the *Progress in International Reading Literacy Study* (PIRLS), the reading literacy achievement of 10-year-old children across the world is examined every 5 years. In PIRLS, reading literacy is defined as

the ability to understand and use those written language forms required by society and/or valued by the individual. Young readers can construct meaning from a variety of texts. They read to learn, to participate in communities of readers in school and everyday life, and for enjoyment (Mullis, Kennedy, Martin & Sainsbury, 2006, p. 3).

When it comes to the attainment of reading literacy, the particular sociolinguistic position of minority groups should be recognised (cf. August & Shanahan, 2006; Verhoeven, 2011). Ethnic minority groups are often confronted with the task of learning to read in the dominant language of the majority group, which they usually learn as a second language (L2). Previous studies showed consistent findings of lower reading literacy abilities for L2 students of lower socioeconomic backgrounds compared with first-language (L1) students with a comparable background (Droop & Verhoeven, 2003; Kindler, 2002; OECD, 2007). Research to date has identified sociocultural factors that influence and explain the variation in reading achievement for both L1 and L2 students (De Jong & Leseman, 2001; Lesaux, Lipka & Siegel, 2006). However, most of the studies conducted used standard one-level analysis, failing to take into account the hierarchical structure and interdependent nature of the data that an educational setting entails (Hox, 1998; Muthén, 1991; Snijders & Bosker, 2012). In the present study, multilevel modelling analysis was conducted to investigate the role of sociocultural factors – home and school socioeconomic status (SES), home and school literacy environment and reading attitudes – in explaining the variation in reading literacy achievement of linguistically diverse groups in the Netherlands.

Home and school socioeconomic status

There is ample evidence that factors related to the student's socioeconomic background, such as parental education, income and occupation, have an effect on reading literacy achievement (Marks, 2005; Sirin, 2005). Children of higher educated parents obtain in general better reading results. The parents may be more familiar with the language and culture of school, and there may be a better alignment between home and school. It has indeed been found that Dutch children with high-educated parents make more progress during elementary school than children of low-educated and/or immigrant parents (Driessen, Van Der Silk & Van Der Bot, 2002; Luyten & Ten Bruggencate, 2011). Stahl (1999) stated that 3-year-old children of high-educated parents have a vocabulary that is five times the size of the vocabulary of children of low-educated parents. This may in turn affect the attainment of reading ability in both L1 and L2 students (Rydland, Aukrust & Fulland, 2012; Verhoeven & Van Leeuwe, 2008).

Previous research states that also school-related SES factors, such as the school location and SES characteristics of the student population, predict students' reading literacy achievement, in addition to the individual SES of the student (Portes & Macleod, 1996; Rauh, Parker, Garfinkel, Perry & Andrews, 2003). For the composition of school population, Dronkers (2010), for instance, found that a higher share of students with a migrant background and of lower SES at a school may hamper the reading achievement of the whole group. These school-related SES factors are often referred to as the school SES.

Literacy environment of the home and school

The literacy environment in both the family and the school is an important factor that influences reading achievement (De Jong & Leseman, 2001; Tabors & Snow, 2001). Parents play an important role in creating a constructive reading environment, for instance,

through their attitude towards reading and the literacy activities that they carry out with their child (Baker & Scher, 2002; Snow & Beals, 2006). The home literacy environment of L2 students has been a topic of investigation for various studies (Mullis, Martin, Kennedy & Foy, 2007; Van Diepen, 2007; Van Elsäcker, 2002). The home reading resources of L2 students are generally smaller than those of L1 students (Netten, Droop & Verhoeven, 2011). Scheele, Leseman and Mayo (2010) showed that the amount of language learning activities at home differed between L1 and L2 students. The Turkish-Dutch and Moroccan-Dutch children in their study participated in less shared book reading and fewer oral language interactions in both L1 and L2 than the L1 Dutch students.

The literacy environment that surrounds a student not only is limited to the home but also comprises the student's neighbourhood, peer group, school and class, which all have their own subculture of literacy and language practices and traditions (Serpell, 2001). The literacy environment in a class or school is an important factor that can support students in reading achievement. There is a positive relationship between the number of opportunities that students receive to apply and improve their skills – by spending more time on reading in classrooms – and their reading achievement (Duke & Pearson, 2002; Sonnenschein, Stapleton & Benson, 2010). Also, the quality of the instructional approach influences outcomes (Guthrie, McRae, Coddington, Klauda, Wigfield & Barbosa, 2009). Teaching reading strategies, such as making predictions, positively affect the students' reading literacy abilities (McKeown, Beck & Blake, 2009; Spörer, Brunstein & Kieschke, 2009; Van Keer, 2004).

Reading attitudes

Another important factor to consider in explaining variation in reading literacy achievement is the student's reading attitude (Aunola, Nurmi, Niemi, Lerkkanen & Rasku-Puttonen, 2002; Cox & Guthrie, 2001; Guthrie, Wigfield, Humenick, Perencevich, Taboada & Barbosa, 2006; Verhoeven & Snow, 2001). When students are motivated to read and consider themselves as confident readers, they will in turn spend more time reading and hence improve their reading levels, as well as their vocabulary and knowledge of the world (Guthrie & Wigfield, 2000; Perfetti, Landi & Oakhill, 2005; Taboada, Tonks, Wigfield & Guthrie, 2009). Research shows aspects of motivation and self-confidence to be influenced by linguistic factors (Dörnyei, 2001). For instance, the difference between the home language and the language used in school may influence the motivation and self-confidence of L2 students (Aarnoutse, Van Leeuwe, Voeten & Oud, 2001; Guthrie, Coddington & Wigfield, 2009). In a similar vein, low expectations for future success could be a motivational explanation for the lower reading achievement of L2 students (Graham, Taylor & Hudley, 1998; Taylor & Graham, 2007).

Problem statement

The focus of the present study is on students with a Turkish or Moroccan ethnic background, which are the two largest ethnic minority groups in the school population in the Netherlands. These groups share characteristics of SES, migration history and sociocultural orientation and can be seen as highly comparable in these respects (Driessen, 2001). The first groups of Turkish and Moroccan migrants came to the Netherlands in the 1970s for unschooled labour. Many of them came from rural areas and had received limited

education in their home countries. Today, the second generation and third generation of immigrant children enter primary school. Although there is variation within the groups, many of the families mainly speak their native language in the home setting, and children enter primary education with limited knowledge of the Dutch language, which has an impact throughout their school career (Dagevos, Gijsberts & Van Praag, 2003; Driessen & Dekkers, 2007; Verhoeven & Vermeer, 2006). Lower achievement scores in the majority language on standardised tests for vocabulary knowledge and reading comprehension remain throughout the primary school years, despite initiatives launched for enhancing language proficiency and school performance (Driessen & Dekkers, 2007; Ministry of Education, Culture, and Science, 2011).

A better understanding of the influence of sociocultural factors on the reading achievement of L1 and L2 students may help in creating interventions for enhancing reading ability. Our study extends previous research: differences between L1 and L2 students with regard to the home and school SES, home and school literacy environment and reading attitudes were investigated in one design and were examined by means of multilevel modelling analysis taking into account hierarchical structure and interdependent nature of the data. In order to identify those factors that would be eligible for interventions, we chose to divide the variables into antecedent conditions and malleable factors in our multilevel analyses. The antecedent conditions are those conditions that cannot be influenced by the educational system, school or teacher. They are set conditions that students enter primary education with, such as SES. Malleable factors are those factors that may be influenced in order to obtain a better output and therefore can be a focus for programmes aimed at improving reading achievement. Reading attitudes might be such a malleable factor that can be influenced through changes in reading education.

In the present study, the variation in reading literacy achievement of Dutch L1 students and Turkish-Dutch and Moroccan-Dutch L2 students was related to the home and school SES, home and school literacy environment and reading attitudes within one design. Multilevel modelling analyses were conducted in order to find an answer to the following questions:

1. What are the differences between L1 and L2 students in reading literacy achievement, home and school SES, home and school literacy environment and reading attitudes?
2. To what extent are home and school SES, home and school literacy environment and reading attitudes related to the students' reading literacy achievement, and are these factors to the same extent related to the reading literacy abilities of L1 and L2 students?

Method

Participants

The present study was part of PIRLS conducted by the International Association for the Evaluation of Educational Achievement (IEA, 2006), for which the Dutch data were collected by the first author of this article. A stratified multistage cluster sampling design was used to select a representative sample of students from the Netherlands by means of picking 150 schools. The sampling frame entailed a mean student weight indicator (low, medium and high) as explicit stratification variable and degree of urbanisation (very high, high, moderate, low and very low) as implicit stratification variable (Martin, Mullis & Kennedy, 2007). All schools for primary education were available in the sampling frame.

All grade 4 classrooms within a sampled school were sampled. In the end, a sample of 3,757 children from 207 classes in 139 schools in the Netherlands participated in the present study.

Of the 139 schools, 59.0% had one grade 4 class, 35.3% had two grade 4 classes, and 5.8% had more than two grade 4 classes. The mean age of the participants was 10.3 years. To identify the groups of L1 and L2 students, the question 'Which language did you speak before you started school' from the student questionnaire was used. For each listed language, they could answer YES or NO (and they could add their language if it was not listed). The students who ticked off yes for either Turkish or Moroccan (this can be either Moroccan-Arabic or Berber) were selected for the L2 group. These L2 students could also have answered that they spoke Dutch next to speaking Turkish or Moroccan in the home. Subsequently, the students ticking off yes to another language than Dutch were deleted, leaving only those students in the L1 group that ticked off yes for Dutch and no other language (L1). The group of L1 students consisted of 3,549 students (49% boys and 51% girls); the remaining 208 students (55% boys and 45% girls) had a Turkish-Dutch ($n = 123$) or Moroccan-Dutch ($n = 85$) background and form the group of L2 students.

Variables

Reading literacy achievement. The level of reading literacy achievement was assessed with the PIRLS Reading Literacy Test. The reading literacy test consisted of two types of passages, which represented two purposes for reading: reading for literary experience (literary texts) and reading to acquire and use information (informational texts). Within both reading purposes, the PIRLS test was designed to measure four major processes of comprehension: (a) focus and retrieve explicitly stated information; (b) make straightforward inferences; (c) interpret and integrate ideas and information; and (d) examine and evaluate content, language and textual elements. The test consisted of 10 passages: five literary and five informational texts. The 10 passages were divided between 13 booklets, by use of a rotated booklet design. One booklet was randomly assigned to a student; a booklet contained two passages and associated questions. Multiple choice and constructed-response (open-ended) items were used. The internal consistency of the reading literacy test for the Netherlands was good, with a Cronbach's alpha of $>.81$ (Mullis, Martin, Kennedy & Foy, 2007, p. 306). In all schools, the reading literacy test as well as the student questionnaire was administered in a classroom setting, during one morning; the student questionnaire was administered directly after the reading test.

Progress in International Reading Literacy Study questionnaires. Background information concerning student's reading behaviour and attitudes, as well as regarding the student's environment, was gathered with four questionnaires. Each participating student completed a student questionnaire. Also, the parents or guardians of the participating students filled out a questionnaire, which was given to the students to take home and parents could send back by post. Furthermore, the teachers answered a questionnaire with the students taking the PIRLS test in mind. Finally, principals answered the questions in the school questionnaire concerning the school curriculum and school characteristics (International Association for the Evaluation of Educational Achievement, 2006).

All variables stated later were derived from these PIRLS questionnaires. All scales that are mentioned are constructed using a factor analysis by the IEA (Foy & Kennedy, 2008) and were confirmed using the Dutch data. The aggregated scores on the scales were used in

the analyses. Only scales with an internal consistency of Cronbach's alpha > .60 were seen as satisfactory and were used to conduct the analyses.

Student questionnaire The students' *gender* was represented by a dummy variable: 0 = boy and 1 = girl. *Computer use at home and at school* was indicated by a four-point scale (4 = every day or almost every day, 3 = once or twice a week, 2 = once or twice a month and 1 = never or almost never).

Reading activities at home: The scale (α = .72) consisted of 12 items and concerned the frequency of reading comic books, stories or novels, books that explain things, magazines, newspapers, directions or instructions and the responses to the following statements: how often do you (a) read aloud to someone at home, (b) listen to someone at home reading to you, (c) talk with your friends about what you are reading, (d) talk with family about reading, (e) read for fun outside of school and (f) read to find out things you want to learn. The answers were given using a four-point scale (4 = every day or almost every day, 3 = once or twice a week, 2 = once or twice a month and 1 = never or almost never).

Reading activities at school: The scale (α = .64) consisted of nine items and concerned the responses to the following statements: how often does the teacher read aloud to the class and how often do you (a) read aloud to the whole class, (b) read aloud to a small group, (c) read silently on your own, (d) read books that you choose yourself, (e) answer questions in a workbook, (f) write something about what you have read, (g) answer questions aloud about what you have read and (h) talk with other students about what you have read. The answers were given on a four-point scale (4 = every day or almost every day, 3 = once or twice a week, 2 = once or twice a month and 1 = never or almost never).

Reading attitude: The scale (α = .68) consisted of five items and concerned the responses to the following statements: I only read if I have to (reverse coded); I like talking about books with other people; I would be happy if someone gave me a book as a present; I think reading is boring (reverse coded); I enjoy reading. The answers were given using a four-point scale (4 = agree a lot, 3 = agree a little, 2 = disagree a little and 1 = disagree a lot).

Reading self-concept: The scale (α = .74) consisted of four items: reading is very easy for me; I do not read as well as other students in my class (reverse coded); when I'm reading by myself, I understand almost everything that I read; I read slower than other students in my class (reverse coded). The answers were given using a four-point scale (4 = agree a lot, 3 = agree a little, 2 = disagree a little and 1 = disagree a lot).

Parent questionnaire Home SES was measured with two variables: parents' education (1 = not been to school, 2 = primary school, 3 = junior general secondary and prevocational education, 4 = senior secondary vocational education, 5 = senior general secondary education, 6 = pre-university education, 7 = higher professional education and 8 = university) and parents' occupation (1 = never worked outside the home, 2 = small business owner, 3 = clerk, 4 = service or sales worker, 5 = skilled agricultural or fishery worker, 6 = trade worker, 7 = machine operator, 8 = general labourers, 9 = corporate manager or senior official, 10 = professional and 11 = technician or associate professional).

The parents indicated the *number of books in the home* on a five-point scale (1 = 0–10 books, 2 = 11–25 books, 3 = 26–100 books, 4 = 101–200 books and 5 = ≥200 books). The

parents' responses to the question – in a typical week, how much time do you usually spend reading for yourself at home – were used to determine the variable *parents reading at home*. The answers were given using a four-point scale (1 = ≥1 hour a week, 2 = 1–5 hours a week, 3 = 6–10 hours a week and 4 = ≥10 hours a week).

Early literacy activities in the home: The scale (α = .73) consisted of seven items and reflects the parents' responses to the question how often they performed the following activities with their child before it began grade 1 (in either L1 or L2): reading books, telling stories, singing songs, playing with alphabet toys, playing word games, writing letters or words and reading aloud signs and labels. The answers were given using a three-point scale (1 = never or almost never, 2 = sometimes and 3 = often).

Parents' attitudes towards reading: The scale (α = .84) consisted of five items and reflects the parents' responses to statements about reading (in either L1 or L2): I read only if I have to (reverse coded); I like talking about books with other people; I like to spend my spare time reading; I read only if I need information (reverse coded); reading is an important activity in my home. The answers were given using a four-point scale (4 = agree a lot, 3 = agree a little, 2 = disagree a little and 1 = disagree a lot).

Teacher questionnaire *Class size* and *reading strategies* were selected from the teacher questionnaire. The *reading strategies* scale (α = .80) consisted of the following seven items, in which teachers were asked to indicate how often they ask their students to do the following things to help develop reading comprehension skills or strategies: identify the main ideas of what they have read; explain their understanding of what they have read; compare what they have read with their experiences; compare what they have read with other things that they have read; make predictions; make generalisations; and describe the style or structure. The answers were given using a four-point scale (4 = every day or almost every day, 3 = once or twice a week, 2 = once or twice a month and 1 = never or almost never).

School questionnaire School SES was measured with three variables from the school questionnaire: *school location* or city size (1 = Less than 3,000 people to 6 = more than 500,000 people), the *percentage of economically disadvantaged students* (1 = 0–10%, 2 = 11–25%, 3 = 26–50% and 4 = ≥50%) and the *percentage of L2 students* (1 = 0–10%, 2 = 11–25%, 3 = 26–50% and 4 = ≥50%).

Procedure

Working with large-scale assessment data holds a number of implications that need to be taken into consideration when analysing the data and interpreting the results (Rutkowski, Gonzalez, Joncas & Von Davier, 2010). First, when analysing large-scale assessment data, a multilevel modelling analysis is nearly always required. In standard methods of data analysis, the assumption is made that the data are obtained through a simple random method. This would only be appropriate if students were selected at random from a list of all eligible students. In practice, however, most studies conduct multistage sampling methods, where first schools are selected at stage one and classes and students within these schools are selected at the next stages. Therefore, the assumption of identically distributed and

independent observations that standard methods require does not apply. Educational data are typically clustered (nested) data, in which a student is nested within a class, which is nested within a school. Classes nested in a school and students nested in a class have similar characteristics and are interdependent. When we fail to take into account the hierarchical structure of the data and the interdependence, an accurate estimation of population parameters cannot be made, and the standard errors are negatively biased, which results in inflated test statistics (Agresti & Finlay, 2009; Snijders & Bosker, 2012). In the current study, a three-level modelling analysis was chosen to take into account the cluster effects and data dependence (Snijders & Bosker, 2012). The multilevel modelling analysis was conducted with MLwiN 2.0 software (Rasbash, Steele, Browne & Prosser, 2005). Another important feature of multilevel analysis is that it explicitly distinguishes the variance in the outcome variable at different levels. In the present case, this means that the analyses specifically show what percentage of variance in reading achievement relates to difference between schools, difference between classes within schools and, finally, what percentage relates to difference between students within classes.

A second implication of working with large-scale assessment data is that sampling weights were calculated involving selection probabilities for schools, classrooms and students, in order to adequately estimate the population characteristics. These weights adjusted for any stratification or disproportional sampling of the relevant subgroups and for any nonresponses. We used the appropriate weights in the analyses, which ensures that the weighted sample corresponds to the actual sample size in a country (Foy & Kennedy, 2008). However, the proper use of sampling weights for international comparative data is under debate, although the use or nonuse of these weights does not seem to affect the finding of significant effects (Snijders & Bosker, 2012).

Third, because of the rotated booklet design, only a limited subset of items was administered to each student, and not all passages are equally easy or difficult; the individual student scores could not be used to make comparisons between students. Therefore, the PIRLS assessment data were scaled using Item Response Theory, with an international mean of 500 and a standard deviation of 100. For each student, on the basis of the skills of that student (determined by two passages) and the difficulty of an item, an expected skill distribution was made. Randomly, five points were taken from this distribution, called plausible values. These five plausible values formed the estimated reading literacy score of a student. For detailed information about this process, see Foy and Kennedy (2008). The analyses in the current study were conducted for each plausible value separately, after which aggregate estimates of the coefficients and their standard errors were computed.

The fourth challenge that we encountered when analysing the PIRLS data was that the predictor variables at different levels had missing values because of nonresponse or incomplete answers. For the predictors derived from the student questionnaire, complete data were available for 88.7% of the students. Non-response was higher for the home questionnaire; complete data from this questionnaire were available for 68.0% of the students. For the teacher questionnaire, data were obtained from 87.0% of the teachers. On the school questionnaire, 83.5% of the schools provided complete data on the selected predictors.

Multiple imputation was chosen to handle the missing values in the dataset (Collins, Schafer & Kam, 2001; Schafer, 1999). This procedure was executed using SAS software (SAS Institute, 2003).

Descriptive statistics, followed by analyses of variance, were computed to investigate significant differences between the means of the L1 and L2 students on the predictors. To answer the

second research question, a series of multilevel modelling analyses were conducted to explore the relations between reading literacy and its predictors. All predictors that were entered in the multilevel model were first divided into antecedent conditions and malleable factors. An overview of all the predictors is shown in Table 1.

The multilevel modelling analysis was conducted for all students with the first model (model 0), entailing the distribution of the total variance in reading literacy achievement across the school, class and student levels. The antecedent student predictors were entered next (model 1), followed by the school antecedent predictors (model 2). The next model (model 3) also included the malleable student predictors, and the final model (model 4) integrated all antecedent and malleable predictors of the student and school. The antecedent predictors relate to 'given' student and school characteristics (e.g. parents' occupations and school location). The malleable predictors relate to characteristics that are (at least to some extent) prone to manipulation by the school (e.g. reading activities at school and reading self-concept). Finally, in order to determine whether the strengths of the relationships between the entered predictors were similar for L1 and L2 students, the interaction effects for the variable linguistic background were examined.

Results

Research question 1 What are the differences between L1 and L2 learners in reading literacy achievement and SES of the home and school, literacy environment of the home and school and reading attitudes?

Analyses of variance were carried out to investigate differences between the groups of L1 and L2 students on the background predictors. Both the mother ($F(1, 3755) = 100.20$, $p < .001$) and the father ($F(1, 3755) = 74.76$, $p < .001$) of L1 students reported a higher educational level compared with the L2 parents. No significant differences between the groups of L1 and L2 were found with regard to the occupation of the mother ($F(1, 3755) = 1.20$, $p = .272$) and the father ($F(1, 3755) = .324$, $p = .569$).

The L2 students live in larger cities (school location; $F(1, 3755) = 128.1$, $p < .001$) and attend schools with a higher percentage of low SES students ($F(1, 3755) = 486.59$, $p < .001$), as well as a higher percentage of L2 students ($F(1, 3755) = 466.23$, $p < .001$). Also, the average class size for the L1 and L2 students differed significantly ($F(1, 3755) = 84.1$, $p < .001$). The L2 students are taught in smaller classes than the L1 students, because schools with large numbers of disadvantaged students (including L2) receive extra funding for staff.

The descriptive statistics and results of analyses of variance on the other predictors are presented in Table 2. It shows that L1 students performed significantly better on reading literacy. L1 students had significantly more books in the home; they had parents with a more positive attitude towards reading, who read significantly more hours at home. The L2 students reported more reading activities inside and outside school, and they used the computer more often at school than the L1 students. No significant differences were found on the other predictors.

Research question 2 To what extent are SES of the home and school, literacy environment of the home and school and reading attitudes related to the students' reading literacy achievement, and are these factors to the same extent related to the reading literacy abilities of L1 and L2 learners?

Table 1. Mapping antecedent conditions and malleable factors

		Sociocultural factor	Predictor
Antecedent conditions	Student	Characteristics	Gender
			Linguistic background
		SES home	Education of mother
			Education of father
			Occupation of mother
			Occupation of father
		Literacy environment home	Early literacy activities in the home
			Parents' attitudes towards reading
			Parents reading at home
	School/class	SES school	Number of books in the home
			School location
			Percentage of economically disadvantaged students
			Percentage of L2 students
Malleable factors	Student	Reading attitudes	Reading attitude
			Reading self-concept
		Literacy environment home	Reading activities outside school
			Computer use at home
	School/class	Literacy environment school	Reading activities at school
			Reading strategies
			Computer use at school
		SES school	Class size

SES, socioeconomic status.

In order to answer research question 2, multilevel modelling analyses were performed estimating a sequence of five models. Three-level modelling was used for the so-called zero model (without any predictors), with schools at the highest level. The model showed that most of the variance was situated at the student level (83.9%), but there was also a considerable amount of class-level variance (16.1%). The percentage of school-level variance was nonexisting (0.1%); this suggested that the differences between Dutch schools are small. In model 1, the antecedent student predictors were entered. These predictors explained 20.1% of the total variance. When the antecedent school/class predictors were included (model 2), the total amount of explained variance rose to 21.1%. Model 3 also included the malleable student predictors and explained 34.3%. When the malleable school/class predictors were included (model 4), the amount of variance explained hardly increased; the gain was only 0.4%.

The results of the analyses are shown in Table 3. The effects indicate to what extent reading literacy achievement increases or decreases proportionally in relation to one variable, while controlling for the effects of the other predictors, entered in the model.

The first model showed that seven predictors had a significant effect on reading literacy achievement. Linguistic background had the strongest effect. Gender was also a significant predictor in model 1, with girls outperforming boys. The educational level of the mother

Table 2. Means, standard deviations and analyses of variance

		L1 students	L2 students	p
Reading literacy	M	554	510	.001
	SD	49.75	50.49	
Early literacy activities in the home (max 2)	M	1.35	1.32	.124
	SD	.34	.34	
Parents' attitudes towards reading (max 3)	M	2.26	1.98	.001
	SD	.69	.69	
Parents reading at home (max 3)	M	1.48	.84	.001
	SD	.88	.80	
Number of books in the home (max 4)	M	2.33	1.41	.001
	SD	1.29	1.25	
Reading attitude (max 3)	M	1.76	1.73	.641
	SD	.77	.73	
Reading self-concept (max 3)	M	2.20	2.27	.110
	SD	.69	.58	
Reading activities outside school	M	1.10	1.39	.001
	SD	.50	.55	
Computer use at home (max 4)	M	2.38	2.42	.529
	SD	.82	.91	
Reading activities at school	M	1.31	1.55	.001
	SD	.44	.49	
Reading strategies (max 3)	M	1.59	1.63	.238
	SD	.43	.43	
Computer use at school (max 4)	M	1.55	1.70	.012
	SD	.87	.79	

and the father as well as the occupation of the mother had a significant effect. Also, early literacy activities that were carried out by the parents before grade 1 and the parents' attitudes towards reading had a positive effect on reading literacy achievement.

When the antecedent school predictors were added in model 2, only the percentage of L2 students in a school had a significant effect. The effect was negative, so reading achievement of students in a school decrease, when more L2 students attend that school.

As for the malleable student predictors that were entered in model 3, reading attitude and reading self-concept were found to be important predictors for reading literacy. In model 3, gender no longer had a significant effect; after controlling for reading attitudes and self-concept, the differences between boys and girls were no longer significant.

In the final model, the malleable school/class predictors were entered. Only reading activities at school contributed significantly to the prediction of reading literacy. The more reading activities took place at school as described by the student, the lower the reading achievement.

To conclude, in the final model, 10 of the entered predictors had a significant effect: linguistic background, education of mother and father, occupation of mother, early literacy

Table 3. Multilevel modeling analysis addressing the impact of predictors on student achievement (*n* = 3,757)

	Model 0	Model 1	Model 2	Model 3	Model 4
β	550.262 (1.851)	460.912 (5.589)	465.851 (5.742)	417.470 (6.947)	417.692 (9.570)
Linguistic background (1 = Dutch)		**30.345** (3.517)	**27.407** (3.545)	**29.295** (3.145)	**28.393** (3.383)
Gender (1 = girl)		**5.770** (1.719)	**5.748** (1.707)	-0.131 (1.551)	-0.182 (1.546)
Education of mother		**5.295** (0.584)	**5.105** (0.583)	**5.272** (0.522)	**5.274** (0.518)
Education of father		**3.714** (0.627)	**3.643** (0.632)	**2.229** (0.588)	**2.080** (0583)
Occupation of mother		**-0.556** (0.240)	**-0.503** (0.240)	-0.414 (0.233)	**-0.459** (0.229)
Occupation of father		0.329 (0.318)	0.357 (0.317)	0.578 (0.297)	0.575 (0.294)
Early literacy activities in the home		**14.361** (2.967)	**14.683** (2.958)	**8.434** (2.697)	**8.849** (2.693)
Parents' attitudes towards reading		**6.578** (1.555)	**6.451** (1.534)	**2.881** (1.364)	**2.945** (1.370)
Parents reading at home		-0.501 (1.096)	-0.484 (1.093)	0.615 (0.976)	0.587 (0.967)
Number of books in the home		0.453 (0.853)	0.317 (0.853)	-0.024 (0.712)	-0.173 (0.713)
School location			0.267 (1.004)	-0.287 (0.940)	-0.435 (0.974)
Percentage of economically disadvantaged students			-0.513 (1.926)	-0.126 (1.813)	0.130 (1.756)
Percentage of L2 students			**-5.586** (1.916)	**-6.044** (1.879)	**-5.717** (1.841)
Reading attitude				**12.650** (1.117)	**12.734** (1.132)
Reading self-concept				**22.381** (1.448)	**22.138** (1.433)

(Continues)

Table 3. Continued

	Model 0	Model 1	Model 2	Model 3	Model 4
Reading activities outside school				-1.174 (1.493)	0.948 (1.586)
Computer use at home				-0.856 (0.902)	-0.718 (0.939)
Reading activities at school					**-5.696** (1.747)
Reading strategies of teacher					0.089 (2.110)
Class size					0.326 (0.257)
Computer use at school					-1.187 (1.299)
Variance components					
Explained (%)	20.1	21.1	34.3	34.7	

Fixed effects (standard errors in brackets).
Significance level $p < 0.05$ printed in bold.

Table 4. Multilevel modeling analysis addressing the differences between L1 and L2 students ($n = 3{,}757$) variance components

		Model Linguistic background
School-level variance	0.1%	0.1%
Class-level variance	16.1%	12.6%
Student-level variance	83.9%	81.9%
Explained (%)		5.34%

activities at home, parents' attitudes towards reading, percentage of L2 students, reading attitude, reading self-concept and reading activities at school.

The analyses that were conducted to examine the differences between L1 and L2 students showed that linguistic background explained 5.34% of the variance in reading literacy (Table 4). The interaction effects were examined in order to determine whether the strength of the relationships between the entered predictors is similar for L1 and L2 students. Although the effect sizes for some of the predictors were large, no significant interaction effects were found. This indicated that the extent of the effects of the predictors included in the model did not differ for L1 and L2 students.

Conclusions and discussion

The present study confirms previous findings that L1 students outperform L2 students regarding their reading literacy achievement in the Netherlands (Aarnoutse et al., 2001; Droop & Verhoeven, 2003; Van Elsäcker, 2002; Verhoeven, 2000). This result leads to the assumption that the limited Dutch language proficiency that this group enters primary education with has a continuing effect throughout their education (Dagevos et al., 2003; Driessen & Dekkers, 2007).

In response to the first research question – What are the differences between L1 and L2 learners in reading literacy achievement and SES of the home and school, literacy environment of the home and school and reading attitudes – the results show significant differences between L1 and L2 students regarding the lower level of education of L2 parents, which is in line with previous research (Ministry of Education, Culture, and Science, 2011; Tesser & Dronkers, 2007). The home and school literacy environment were also found to differ between the groups of L1 and L2 students, with L1 students reporting more home reading resources and a more positive home reading environment, confirming the outcome of earlier studies (De Jong & Leseman, 2001; Netten et al., 2011; Scheele et al., 2010). No differences were found between the subgroups on reading attitudes, which suggests that differences in reading attitudes and self-concept cannot account for the difference in reading achievement between L1 and L2 learners.

In response to the first part of the second research question – To what extent are SES of the home and school, literacy environment of the home and school and reading attitudes related to the students' reading literacy achievement – the results show that there are strong links between the predictors and reading literacy achievement; the full model explained more than one third of the variance in reading literacy. This means that two thirds of the variance is still unexplained and probably can be attributed to factors that are not included in this model, for instance, vocabulary and decoding speed. Most of the variance was situated at the student level, and almost 16% of the variance was situated at the class level.

The percentage at the school level was extremely small, suggesting that differences between Dutch schools are quite minimal. In the final model, linguistic background, various aspects of home and school SES, home and school literacy environment and reading attitudes made significant contributions to the prediction of students' reading literacy achievement. The influence of SES on reading ability of students is evident in previous research (Driessen et al., 2002; Verhoeven & Vermeer, 2006). Our findings are consistent with Marks' (2005) conclusion that L2 students' weaker performance is largely due to SES factors but that these SES factors cannot explain all of the variance. It was also found out that the percentage of L2 students in a school influenced the reading literacy abilities of students, which is consistent with previous studies indicating the influence of school population on individual achievement (Dronkers, 2010; Portes & Macleod, 1996; Rauh et al., 2003).

With respect to the home and school literacy environment, significant effects on students' reading literacy achievement were found confirming previous research (Baker & Scher, 2002; Christian, Morrison & Bryant, 1998; De Jong & Leseman, 2001; Tabors & Snow, 2001; Van Diepen, 2007). The reading achievement decreases with an increase in the number of reading activities in a class. This could be a result of the Dutch educational system that allows schools to determine their own curriculum. Therefore, teachers are able to spend more time on reading activities in a class where the majority of the students experience difficulties with reading. The current findings are also in accordance with research on the relationship between reading achievement and reading attitudes (Aunola et al., 2002; Guthrie & Wigfield, 2000) showing that students who are highly motivated to read and perceive themselves as being good readers have better reading abilities (Perfetti et al., 2005; Taboada et al., 2009).

In order to determine whether the strengths of the relationships between the entered factors are similar for the two subgroups of L1 and L2 students, and to answer the second part of the second research question – are these factors to the same extent related to the reading literacy abilities of L1 and L2 learners – the interaction effects were examined. The present study did not show any significant differences in effect between the groups of L1 and L2 students.[1] This is an interesting outcome and in contrast to previous research (Van Elsäcker, 2002; Netten et al., 2011). It suggests that the relationships between the sociocultural factors, used in the model, and reading literacy abilities, are the same for L1 and L2 students. For instance, a positive literacy environment is of equal importance for the group of L1 and L2 students with regard to their reading literacy skills. Of course, we have to take into account that the group size of L2 students in this study was rather small. In order to confirm the outcome, further research should include a larger sample size of students.

Several other limitations apply to the present study. The Dutch dataset has a large amount of missing data, especially concerning the parent questionnaire. This has implications for knowing how representative the Dutch data were and the generalisability of the results. Also, although this study sheds light on the sociocultural factors that influence reading literacy achievement at grade 4, the cross-sectional data do not allow for causal inference and merely tell something about a single point in time; therefore, a longitudinal study should be conducted (Lesaux, Siegel & Rupp, 2007). Additionally, as not all ethnic minorities in the Netherlands can be seen as a homogeneous group with respect to their history, economic circumstances and predictors in the sociocultural domain, the results of the present study should not be generalised to all ethnic minority groups (Driessen, 2001).

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[1]These findings are not reported in the present article. Interested readers are invited to contact the authors for more details.

Notwithstanding these limitations, the present study contributes insights about the sociocultural factors influencing both L1 and L2 students' reading ability and allows us to make assumptions about the implications for students, lagging behind in reading ability. In order to identify those factors that would be eligible for interventions, we chose to divide the predictors into antecedent conditions and malleable factors. A malleable factor that had a positive effect on reading achievement was the students' literacy environment. Early interventions should start before the children enter primary education (Dickinson & Porche, 2011; Lesaux & Siegel, 2003), and aim at improving language skills, focusing on vocabulary stimulation through the literacy environment offered in the home and daycare, playgroup or kindergarten. By educating kindergarten and preschool teachers about the importance of early literacy activities and making them aware of their own practices, the quality of support that they provide for children's language and literacy development can be improved (Dickinson & Caswell, 2007; Dickinson & Porche, 2011). Castro, Páez, Dickinson and Frede (2011) provide an overview on instructional practices and strategies stemming from research that are of importance in teaching L2 students in early education, such as creating language-rich and literacy-rich environments, exposure to sophisticated vocabulary and the use of bilingual children's first language in instruction.

Further policy recommendations that can be derived from the present study relate to the students' reading attitudes. Guthrie, Coddington and Wigfield (2009) stated that groups of students who experience diverse cultural, social and academic environments may vary in distinctive motivations and motivational profiles. While the current study found reading attitudes to be of importance for both L1 and L2 students, this should be addressed and given their own attention and intervention implications. In order to motivate the specific subgroups of students, initiatives should take into account the sociocultural environment and build stronger relations between neighbourhood and school.

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