

The Impact of Mother Tongue Instruction on the Development of Biliteracy: Evidence from Somali–Swedish Bilinguals

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This study investigates if participation in mother tongue instruction (henceforth MTI) impacts the biliteracy proficiency of young bilinguals, drawing on examples from Somali–Swedish bilinguals and Somali MTI in a Swedish school context. In the study, biliteracy was operationalized as reading proficiency and vocabulary knowledge in two languages, which was tested with measures of word decoding, reading comprehension, and vocabulary breadth and depth. The study was designed to allow for cross-sectional, longitudinal, and cross-linguistic analyses of data. Overall, the results showed that participation in MTI contributed positively to participants' results on Somali reading comprehension, beyond the influence of chronological age, age of arrival, and reported home language and literacy use. Furthermore, higher results in Somali were associated with higher results on the same measures in Swedish, in particular for the reading measures. In sum, the results indicate that MTI has an impact on some aspects of literacy proficiency in the mother tongue, despite the restricted time allocated for it (<1 h/week). They also indicate that MTI, albeit indirectly, may benefit the stated proficiencies in the language of schooling.

1. INTRODUCTION

Educational research has shown that pedagogical practices where bilingual students are allowed to take advantage of their entire linguistic repertoire are beneficial both for students' bilingual development and for their general school achievement (for an overview, see [García 2009](#)). Formal instruction is also known to be crucial for the development of literacy. Nevertheless, most bilingual students are schooled through one language only, predominantly the majority language. This is the case in Sweden, where most children begin their schooling through Swedish, irrespective of their previous knowledge of the language. Bilingual students may, however, also be entitled to mother tongue instruction (MTI), which refers to non-mandatory state-funded teaching of minority

languages as a subject within the Swedish curriculum.¹ At the policy level, support for MTI is quite strong, as the Swedish Education Act states that all students with a legal guardian who speaks a mother tongue other than Swedish are entitled to instruction in this language, if they have basic knowledge of the language in question, and if the language is used for daily communication in the home (*Utbildningsdepartementet SFS 2010:800*).² MTI has its own subject syllabus which states the overarching aims for all the minority languages encompassed by it, and according to which the main goal is to provide opportunities for students to develop knowledge in and about the mother tongue. At the same time, MTI suffers from various implementation problems. For example, the lessons tend to comprise only 40–60 min per week, often scheduled in the late afternoon, and generally MTI tends to be poorly integrated with other subjects (*Hyldenstam and Milani 2012; Ganuza and Hedman 2015*). One question that arises is what kind of impact MTI can have considering these limitations. The *Council of Europe (2014)* has repeatedly criticized the Swedish government for not taking the measures necessary to ensure the maintenance of the national minority languages, and in their critique, they claim that the current amount of MTI is too marginal to allow students to maintain or develop their competencies in the minority language. There are also increasingly critical voices being raised toward MTI in public debates in the Nordic countries (cf. *Suni and Latomaa 2012*; an illustrative example was an extended debate on bilingualism and MTI in the Norwegian daily newspaper *Aftenposten* in 2013). Among other things, the purpose and impact of MTI are being questioned, and some even imply that increased knowledge in the mother tongue could interfere with students' development of the language of schooling (i.e. consistent with claims of *the interference hypothesis*, for an overview, see *Bylund et al. 2012*). Despite the criticism and the known implementation problems, there have hitherto been few empirical studies on the possible effects of MTI, in Sweden as well as in other contexts where MTI is provided in similar ways.

2. BACKGROUND

2.1 Biliteracy development

The development of literacy is known to be highly dependent on effective instruction (*August and Shanahan 2008*). It is also well known that it is easier for children to develop their reading and writing skills in a language that they know well (*Cummins 1996; Thomas and Collier 1997; Carlisle and Beeman 2000*). Moreover, *García (2009)* argues that L1 literacy development in a minority language context is particularly dependent on access to formal literacy instruction, in addition to opportunities for L1 language and literacy use (*Carreira and Kagan 2011; Kim and Pyun 2014; Outakoski 2015*). In one of the most comprehensive studies on bilingual education to date, *Thomas and Collier (1997)* found that bilingual Spanish–English-speaking students in the USA benefitted most in terms of language development and academic achievement when they were schooled in and through both of their languages. One

explanation is that bilingual education helps students develop and reinforce school language literacy and academic registers in both of their languages.

In the current study, we focus on reading in two languages. Psycholinguistically based theory has typically differentiated between two main interrelated components that constitute reading performance: word recognition (or word decoding) and reading comprehension (Gough and Tunmer 1986; Ouellette 2006; for a discussion of the *simple view of reading* for bilingual learners, see Leider *et al.* 2013). Early readers tend to vary greatly in terms of their accuracy and speed in word recognition, which is also influenced by the size and type of linguistic units (e.g. phonemes, syllables, and rhymes) that readers need to learn for a particular orthography (Alderson *et al.* 2015). As word recognition becomes automatized, readers are able to use more of their cognitive resources for comprehension (Melby-Lervåg and Lervåg 2014). The development of reading comprehension in first language acquisition (L1) as well as in second language acquisition (L2) has been found to be strongly correlated with vocabulary knowledge (Anderson and Freebody 1981; Proctor *et al.* 2006; Alderson *et al.* 2015; Li and Kirby 2015). In addition, a number of external variables, such as parental involvement, home literacy experiences, literacy resources, educational opportunities, and parents' socio-economic status (SES), are also factors known to be important for reading outcomes and academic achievement (Thomas and Collier 1997; August and Shanahan 2008; Kim and Pyun 2014).

2.2 Vocabulary knowledge

Vocabulary knowledge is a key factor in children's development of literacy (Nation 2001). It encompasses a wide range of different skills, but one common conceptualization is the distinction between *vocabulary breadth* and *vocabulary depth* (Kieffer and Lesaux 2008; Schoonen and Verhallen 2008; Li and Kirby 2015). The former refers to the number of words known to an individual, whereas the latter refers to the different dimensions of knowledge that the individual has about each word. These two types of vocabulary knowledge have been found to be highly correlated, that is 'a child who knows more words also tends to know more about each word' (Vermeer 2001: 231, see also Akbarian 2010). Having a large vocabulary is also highly correlated with reading comprehension (Nation 2001), and even more so in a minority L1 or an L2, where the reader may be unable to comprehend a text because she/he is unfamiliar with a few key words (Droop and Verhoeven 2003; Lesaux *et al.* 2010; Alderson *et al.* 2015). Dimensions of vocabulary depth have also been linked to reading comprehension in a number of studies, in L1 as well as in L2 (Qian 2002; Ouellette 2006; Kieffer and Lesaux 2008; Proctor *et al.* 2012; Leider *et al.* 2013).

In terms of vocabulary depth, a distinction is sometimes made between *paradigmatic* and *syntagmatic* word knowledge (Verhallen and Schoonen 1993). Paradigmatic word knowledge refers to hierarchical semantic relations between words, as in antonymy, synonymy, and hyponymy/hypernymy, whereas

syntagmatic word knowledge refers to horizontal word relations, as in collocational and colligational patterns (Schwartz and Katzir 2012). Instruction has been found to be of particular importance for the development of paradigmatic word relations, since these are reinforced when used to *categorize*, *abstract*, *generalize*, and *define* knowledge (Anglin 1985; Snow *et al.* 1991; Verhallen and Schoonen 1993; Ordóñez *et al.* 2002; Schwartz and Katzir 2012).

Studies of vocabulary development along the breadth–depth dimension have compared vocabulary development in young L1 and L2 learners. Typical results of these studies are that L2 learners tend to score well below the average of L1 learners of the same age on measures of both breadth and depth (Verhallen and Schoonen 1993; Vermeer 2001; Schoonen and Verhallen 2008), and that vocabulary growth is slower for L2 learners than for L1 learners (Schmitt and Meara 1997). Similarly, studies of L1 learners in a minority language context have shown that they often do not develop the same lexicogrammatical levels as L1 learners in a majority language context, due to limited L1 exposure (Montrul 2008; see also Alderson *et al.* 2015). Lack of input is the most common explanation for learners' limited vocabulary size or different and less established semantic relations (Schmitt and Meara 1997), but often without taking into account the learners' opportunities for L1 instruction in the minority language context (Schwartz *et al.* 2012).

2.3 Linguistic interdependence

Already in the late 1970s, Cummins (1979) hypothesized about the interdependence of language competencies, and numerous studies have since then demonstrated that higher L1 language and literacy proficiency levels tend to facilitate higher language and literacy proficiency levels in an L2 (for an overview, see Dressler and Kamil 2008; Geva and Genesee 2008). In particular, there is ample evidence of cross-linguistic transfer of phonological awareness and word decoding skills between languages that share alphabetic orthographies (Shakkour 2014). For other competencies, it is still unclear exactly in what way they may transfer between languages or what the limits are of such transfer. In part, this is due to the varying ways in which the constructs are operationalized (Leider *et al.* 2013), but also because some competencies are more difficult than others to study (Proctor *et al.* 2006).

Proctor *et al.* (2012) have argued that research on cross-linguistic influences should take into account the possibly beneficial role of L1 language and literacy instruction for bilingual children, since several studies have suggested that bilingual learners take advantage of their L1 vocabulary knowledge and their L1 reading skills when reading in an L2 (Geva and Genesee 2008; Lesaux *et al.* 2010). For example, in a cross-linguistic study of 135 Spanish–English-speaking students in Grade 4, Proctor *et al.* (2006) found significant effects of L1 Spanish vocabulary on L2 English reading comprehension, in particular for the more fluent English readers (Nakamoto *et al.* 2008). Furthermore, Ordóñez *et al.* (2002) found evidence of cross-linguistic transfer of

paradigmatic word knowledge in Spanish–English bilinguals in Grades 4–5. The children’s production of superordinate lexical knowledge in Spanish predicted their superordinate lexical knowledge in English (cf. *Sheng et al.* 2006).

2.4 Earlier studies of MTI

Several studies have shown the important role of MTI in the identity formation of young bilinguals (for an overview, see *Hyltenstam and Tuomela* 1996), but few studies have investigated the impact of MTI on L1 language development or general school achievement. In a report conducted by the Swedish National Agency for Education (*Skolverket* 2008), it was found that students in Sweden who had attended MTI completed compulsory school with a higher grade point average as compared to students entitled to MTI who had not been enrolled. However, they were unable to show in what way MTI may have enhanced students’ L1 language proficiencies or how these competencies were possibly related to students’ school outcomes. *Bylund and Díaz* (2012) investigated the possible effects of MTI on Spanish grammatical competence and found that a group of Spanish–Swedish bilinguals who attended Spanish MTI outperformed a group of Spanish–Swedish bilinguals of the same age, who had not attended MTI in the past year. Based on the results, *Bylund and Díaz* argued that MTI may counterweigh attrition susceptibility in the mother tongue, but also suggested that the effects may be short term and viable only as long as students attend MTI.

Ganuza and Hedman (2015, 2017) conducted an ethnographic study of MTI, where they observed lessons and interviewed MTI teachers over the course of one year. These data included observations of the Somali instruction received by most of the participants in the current study. In line with the MTI subject syllabus for Grades 1–3 (*Skolverket* 2011), lessons with young children often focused on the teaching of basic literacy skills, such as pronunciation, phoneme–grapheme relationships, syllable and word decoding, and reading of shorter texts. Reading was also often the focus of lessons directed at students in the middle school years (Grades 4–6), but little systematic work on reading comprehension strategies and inferencing was observed (*Ganuza and Hedman* 2015), despite the fact that these are explicit aims of the subject syllabus in Grades 4–6 (*Skolverket* 2011). Vocabulary instruction was often confined to explanations of words during text reading and the use of word lists. Some sporadic work with paradigmatic word relations (antonyms and synonyms) was observed, but in general, the teachers felt constrained by the limited time for MTI and claimed that it hindered their possibilities to work thoroughly with vocabulary and repeat words introduced in previous lessons.

3. AIM OF THE STUDY

Considering the interdependence of language competencies and the important role of instruction for children’s development of vocabulary and reading, the

aim of the current study was to investigate the impact of MTI on children's vocabulary knowledge and reading skills.

The research questions addressed were as follows:

RQ1: Does MTI, in the way that it is organized in Sweden, contribute to children's vocabulary knowledge and reading proficiency in the mother tongue?

RQ2: What is the relationship between students' vocabulary knowledge and reading proficiency in the mother tongue as compared with the stated proficiencies in the language of schooling?

Our predictions were that participation in MTI would contribute positively to participants' vocabulary and reading skills in the mother tongue, and that we would find evidence of cross-linguistic influence on measures of both vocabulary and reading, that is that higher results on the selected measures in the mother tongue would be associated with higher results on the same measures in the language of schooling.

In the current study, we decided to focus specifically on Somali and Somali MTI, as Somali is one of the fastest growing minority languages in Sweden due to recent years of immigration. According to recent statistics (Statistics Sweden 2014), Somali is among the 10 largest languages in which students are entitled to instruction through MTI, and it is also the MTI language with the highest enrollment rate. Research on the Somali minority in a European educational context is also scarce. Furthermore, Somali and Swedish both use alphabetic orthographies (Saeed 1999), and as mentioned previously, cross-linguistic research has shown that certain dimensions of literacy may transfer more easily across languages that share the same orthography (Shakkour 2014).

4. METHODOLOGY

4.1 Participants

In this article, we draw on data from 120 Somali–Swedish bilinguals in Grades 1–6 in compulsory school (ages 6–12 years). Table 1 presents an overview of the participants, in terms of their sex, country of birth, age, age of arrival (AoA) in Sweden, and the number of years that they reported that they had attended MTI. We came into contact with the participants via municipalities and schools where we knew there were many Somali-speaking children, and we received written consent for participation in the study from parents of all participating children. At the time of testing, only 13 children (10.8 per cent) reported that they did not currently attend Somali MTI and another 11 (9.2 per cent) that they had received less than one year of MTI. Thus, the vast majority of participants in this study attended MTI and had done so for several years.

For some of our cross-sectional analyses, we decided to narrow our focus to the group of participants attending Somali MTI, and who at the time of testing had received instruction in the mother tongue for a minimum of one year.

Table 1: Overview of participants' background information

Sex		Country of birth			Age			AoA			YMTI					
Females	Males	Sweden	Somalia	Other	Minimum	Maximum	Mean	SD	Minimum	Maximum	Mean	SD	Minimum	Maximum	Mean	SD
N	Per cent	N	Per cent	N	Per cent	N	Per cent	N	Per cent	N	Per cent	N	Per cent	N	Per cent	N
66	55.0	70	58.3	36	30.0	14	11.7	6	12	9.25	1.68	0	1.75	2.58	0	1.79

Note. N = 120.

YMTI = reported number of years of MTI attendance.

Altogether 96 of the 120 participants fulfilled these requirements. Furthermore, we have longitudinal data (two different data points in two languages), from 46 of the participants in the sub-sample, who volunteered to participate in a second round of testing, and whose parents gave their written consent to participate a second time. These data were collected approximately one year after the first time. Data from the second data point are only used in the longitudinal analyses.

4.2 Participants' language and literacy backgrounds

Before testing the children, we conducted an oral background survey based on a written questionnaire, asking for participants' family and language backgrounds, their literacy practices in Somali and Swedish (frequency of multimedia use, reading, and writing), and their self-perception of their oral and written proficiency in Somali and Swedish.

All of the participants reported that they live and attend school in areas where there is a relatively large Somali-speaking population. Their contact with Somali is, therefore, not necessarily restricted to the family or to the MTI lessons. In terms of language use, a majority of participants reported that they speak more Somali than Swedish with their parents, but more Swedish than Somali with siblings and friends. The majority of the 120 participants was either born in Sweden (70 or 58 per cent) or came to Sweden before age five years (37 or 31 per cent). None of them had arrived in Sweden after age nine years, and at the time of testing, all participants had lived in Sweden for a minimum of two years. Only three participants reported that they had begun schooling in a language other than Swedish (in this case Arabic) before coming to Sweden. Currently, Swedish is the language of schooling for all participants. Based on the participants' reported information about parents' earlier and current employment, and information about the areas where they live, the participants appear to have relatively similar SES. These are also not variables that differed between those attending MTI and those who had received no or little MTI. The primary motivation for not attending Somali MTI among our participants was due to practical reasons, not lack of motivation.

4.3 Language measures

4.3.1 Vocabulary

The *Peabody Picture Vocabulary Test IV* (henceforth PPVT, [Dunn and Dunn 1997](#)) was chosen as a measure of participants' breadth of vocabulary knowledge. The PPVT is a word recognition task, which has been used in many earlier studies with young children, since it measures receptive vocabulary without requiring reading ability. It is a multiple choice test, where the test taker is required to choose one picture (out of four) that best represents a spoken word. The test items are presented in a fixed order. A translation of the

PPVT IV is available in Swedish (Ahlström and Ljungman 2011; Alkass Yousef and Bergström 2011). In the current study, this translation was minimally revised by the authors together with a group of speech–language therapists. The test was then translated, and adapted to Somali with the help of a linguistically trained Somali speaker, and reviewed by several Somali MTI teachers. In Somali, several linguistic variants were sometimes provided for the same item, to ensure that participants would not fail to acknowledge the correct answer due to his/her linguistic variety of Somali. In contrast to common test procedures for PPVT, all participants were tested on 156 items in each language. We decided on this procedure, as our pilot study indicated that the standard given age estimates of the PPVT did not apply to the Somali–Swedish bilinguals, and as the assumed progression of each word set was less clear in the translated versions than in the original English version of the PPVT (cf. Ahlström and Ljungman 2011). Scores were calculated by allocating one point for each correct response, rendering the maximum score 156 in each language. Internal consistencies for the Swedish and the Somali versions of the test were $\alpha = .93$ and $\alpha = .95$.

The authors developed a measure of vocabulary depth specifically for the purposes of this study. It was developed in Swedish, translated and adapted to Somali in collaboration with a linguistically trained Somali speaker, and reviewed by several Somali MTI teachers. The measure contains three sub-sections (antonyms, hypernyms, and synonyms) aimed at capturing paradigmatic semantic relations between words, since these are associated with school-related language use (Verhallen and Schoonen 1993; Schwartz and Katzir 2012), and were observed in the educational materials used in Somali MTI (Ganuza and Hedman 2015). Items were selected from Swedish textbooks often used in the early school years. The first part of the test consisted of 20 items of lexical opposites (antonyms), which were all adjectives or adverbs. Scores were calculated by allocating 2, 1, or 0 points for each response (e.g. the response *small* as an opposite to *big* would render 2 points, whereas a less specific response such as *not big* would render 1 point). The second part of the test aimed at eliciting 15 superordinate lexical terms (hypernyms) in each language. The test administrator asked the participant to provide a single (superordinate) word that could be used to name four different (subordinate) items. As an example, the test administrator asked ‘Which word could be used to name the following four items: dog, cat, horse, and sheep?’ Scores were calculated by allocating 2, 1, or 0 points for each response (e.g. the response *animals* as the hypernym of the four items just mentioned would render 2 points, whereas the response *pets* would render 1 point). Responses not provided in the target language were allocated 0 points. The third part was a 15-item multiple choice synonym test (verbs only, as the antonym and hypernym tests had included nouns, adjectives, and adverbs), which was presented both orally and visually to the participants. Each example consisted of a stimulus verb in the left margin and four test items (also verbs) in the right margin, where only one was synonymous with the stimulus word. Scores were

calculated by allocating one point for each correct response. In sum, the three parts were merged to form one more robust measure of paradigmatic word knowledge, referred to as *lexical depth* in the results. Based on the scoring procedures described for each subpart, the maximum score on this construct was calculated to 85 in each language. Internal consistencies for the Swedish and the Somali versions of the measure were $\alpha = .92$ and $\alpha = .86$.

4.3.2 Reading

Two constructs of reading, word decoding, and (sentence) reading comprehension were operationalized and tested. These were not conducted with participants in Grade 1, as they had only recently begun to learn to read and write.

Participants' *word decoding ability* was measured in Somali with a word-chain test developed by the National Centre for Multicultural Education in Norway (NAFO 2012), and in Swedish with a similar word-chain test developed by Jacobsson (2001). These tests are generally used as screening tests in the early school years, and the Swedish test version has been used in earlier research, and has shown high test-retest reliability (Guron and Lundberg 2003; Lundberg and Reichenberg 2013). The two tests are constructed in a similar way. Each word chain contains three words written together without intervening spaces, and the exercise consists of marking the boundaries between the words in each given chain (cf. Alderson *et al.* 2015). One difference between the tests in the two languages was the maximum score; 24 on the Somali version and 60 on the Swedish version. However, on both tests, participants were given exactly 2 min to read and mark as many word chains as possible (Lundberg and Reichenberg 2013). Scores were calculated by allocating one point for each correct word chain. None of the participants reached ceiling, in either language. Internal consistencies for the Swedish and the Somali versions of the measure were $\alpha = .96$ and $\alpha = .80$.³

Participants' *reading comprehension* was measured by using a combination of a sentence reading comprehension test in Somali, also developed by the National Centre for Multicultural Education in Norway (NAFO 2012), and parts of a Swedish sentence reading comprehension test developed by Magnusson and Nauclér (2010). These tests are often used as screening tests for reading comprehension in Grades 1–5, and measure students' ability to derive meaning from sentences. The use of a similar construct is reported in Lundberg and Reichenberg (2013), and in Åsberg Dahlgren and Dahlgren Sandberg (2008). We decided on sentence reading comprehension as the test needed to be viable with students of different ages and proficiencies, and possible to complete in a relatively short time. In the test, each written sentence is followed by four pictures, and the participant has to mark the picture that she/he thinks best represents the sentence read. The final test consisted of 32 sentences of increasing difficulty, as the sentences are progressively longer, more detailed, and more embedded (cf. Scarborough 1990). The test was identical in Somali and Swedish, that is they contained the same sentences and the same pictures.

The score on this test was the number of correctly marked pictures in 5 min, rendering the maximum score 32. The timing procedure thus conflates reading comprehension with reading fluency in this study (Lundberg and Reichenberg 2013). Internal consistencies for the Swedish and the Somali versions of the reading comprehension test were $\alpha = .89$ and $\alpha = .90$.

4.3.3 Translations

Translations of the tests from Swedish to Somali and/or from Somali to Swedish were conducted by a linguistically trained Somali–Swedish-speaking person in cooperation with the authors. Our focus was on ensuring linguistic equivalence between tests (Peña 2007), but there is a bias toward Swedish, as several measures were developed in Swedish before they were translated into Somali. The PPVT and the reading measures were also not originally developed for bilingual children. We did not do a back translation of the tests (*ibid.*), but items in Somali were reviewed by several Somali MTI teachers, and Swedish items were reviewed by a group of speech–language therapists with experience of testing vocabulary and reading.

4.4 Procedure

All participants were tested individually in Swedish and Somali on two separate occasions, first in Swedish and approximately three weeks later in Somali. The order between the languages was always the same, and could thus be an intervening factor in the results. Each test session took 40–60 min. The first test session commenced with the oral background survey (see above) followed by the measures in the following order: (i) PPVT, (ii) measures of lexical depth, (iii) word chains, and (iv) reading comprehension. Each individual test started with the test administrator providing the participant with a short oral instruction, which included two to three practice items. The Swedish testing was conducted by the authors or a speech–language therapist, and the Somali testing was conducted by two different native Somali-speaking research assistants. The research assistants were trained in the testing procedures by the authors and the speech–language therapist during a test pilot period. All test administrators also received detailed written instructions on how to conduct each test. The second year of testing followed the same routines, and included the same tests and test items. We did not control for participants' general cognitive ability (for an overview of the inconclusive nature of the relationship between non-verbal intelligence and L1 and L2 reading, see Morvay 2015). However, when recruiting participants, teachers were asked not to include students with known reading disabilities, as they might be unable to complete the reading tests.

Table 2: Comparison of results of participants with MTI with the results of participants who have had no or little MTI (rescaled scores from 0 to 100)

Measures	Participants with MTI (MTI more than one year)		Participants with no or little MTI (MTI less than one year)		Independent samples <i>t</i> -test			
	<i>N</i>	Mean (SD)	<i>N</i>	Mean (SD)	<i>t</i>	df	<i>p</i> <	Effect size (Cohen's <i>d</i>)
Vocabulary								
SomPPVT	96	73.55 (10.52)	22	59.82 (19.70)	3.167	24 ^a	.004	0.7
SomLexDepth	96	52.61 (12.56)	22	41.81 (16.15)	3.438	116	.001	0.8
Reading								
SomWoCh	79	29.64 (15.42)	15	13.61 (13.03)	3.775	92	.000	1.1
SomReCo	79	45.57 (16.03)	16	25.00 (17.04)	4.631	93	.000	1.3

Note. N.B. that when calculating the effect sizes in Table 2, we used corrected pooled SDs adjusted to the comparison of groups with different sample sizes (i.e. sometimes referred to as 'hedges *g*'). Swe = Swedish, Som = Somali, LexDepth = measure of lexical depth, WoCh = word chains, ReCo = reading comprehension.

^aEqual variances not assumed.

4.5 Pilot study

The test battery was piloted in the spring of 2013. The Somali–Swedish bilinguals who took part in the pilot study were in second and fourth grade at the time and were not included in the main study. Items with a very low response rate were eliminated or changed. One original test of hyponyms was eliminated due to ceiling effect, and one test of morphological awareness was eliminated due to floor effect. The pilot study also informed us on scoring issues as the study shed light on actual language use and variation among Somali–Swedish bilinguals.

5. RESULTS

5.1 Impact of MTI

First, we divided the large sample (120 participants) into one group with participants who reported that they currently attended MTI, and had done so for at least one year (96 participants), and one group of participants who reported either that they currently did not attend MTI or who at the time of testing had attended MTI for less than one year (24 participants). Second, we compared the results of these two groups on the Somali measures, using independent samples *t*-tests. The results of these comparisons are presented in Table 2. Note

Table 3: Regression model summary table: variables explaining participants' Somali language proficiency

Measures	N	Model 1 (without YMTI)		Model 2 (with YMTI)		
		R^2	Adjusted R^2	R^2	Adjusted R^2	R^2 change (from Model 1)
SomPPVT	116	.204*	.167	.220*	.177	.016
SomLexDepth	118	.242*	.208	.264*	.224	.022
SomWoCh	92	.219*	.174	.221*	.166	.001
SomReCo	92	.337*	.299	.417*	.375	.080*

Note. Independent variables entered in Model 1: Chronological age, sex (dummy coded), AoA, language use with parents, and Somali literacy use.

Independent variables entered in Model 2: Chronological age, sex (dummy coded), AoA, language use with parents, Somali literacy use, and YMTI.

The values in bold indicate statistical significance, $p < .001$.

Som = Somali, LexDepth = measure of lexical depth, WoCh = word chains, ReCo = reading comprehension.

* $p < .001$.

that rescaled scores are reported throughout this text. These have been converted into the range 0–100 by dividing each test score by the theoretical maximum score for each test and multiplying it by 100. The results of the comparison showed that the group of participants who had attended MTI for more than one year outperformed the group of participants who had had no or little MTI on all of the Somali measures.

However, we also wanted to assess the impact of MTI while controlling for the effect of other covarying variables that have been shown to impact minority language proficiency in earlier studies, such as participants' chronological age, AoA, sex, and language use patterns (García 2009; Carreira and Kagan 2011; Kim and Pyun 2014; Alderson *et al.* 2015). In the group of participants who had had no or little MTI, there were, for example, proportionately more young participants (mean age 8.6 years in comparison with 9.3 years in the large sample), as well as two of the participants with the highest AoA. Therefore, we conducted two regression analyses for each language measure in SPSS, where we explored the impact of MTI (operationalized as 'years in MTI', henceforth YMTI), independently of participants' chronological age (henceforth Age), AoA, sex, reported language use with parents, and reported frequency of Somali literacy use (multimedia, reading, and writing).⁴ To tease out the unique contribution of YMTI on the Somali vocabulary and reading measures, we entered all of the independent variables except YMTI in the first model, and then added YMTI in the second model, to see if it would significantly add to the explanation of results beyond the independent variables controlled for in the first model. The regression analyses were conducted

with the large sample ($N = 120$), and a summary of the results is displayed in Table 3 (for a more detailed account of these analyses, see online Appendix).⁵ In Model 1, the independent variables together explained 16.7 per cent (the adjusted R -square value) of the variance in results on the Somali PPVT, 20.8 per cent of the variance in results on the Somali lexical depth measure, 17.4 per cent of the variance in results on the Somali word decoding test, and finally 29.9 per cent of the variance in results on the Somali reading comprehension test. In the Model 2, the variable YMTI was added, which explained an additional 1.6 per cent of the variance in results, beyond Model 1, for Somali PPVT and an additional 2.2 per cent for Somali lexical depth. However, the change in R -square did not quite reach statistical significance for either of these two measures ($p = .13$ and $p = .08$, respectively). For Somali word decoding, YMTI did not add any explanatory value beyond the independent variables entered in Model 1. In contrast, for Somali reading comprehension, the variable YMTI added an additional 8 per cent explanatory value to the variance in results, which was also statistically significant at $p < .001$. In sum, the results thus suggest that YMTI uniquely and positively contributed to participants' performance on Somali reading comprehension, beyond the other variables controlled for. For Somali vocabulary, we cannot inconclusively say that YMTI contributed uniquely and positively to the results beyond the other independent variables entered into the analyses.

5.2 Cross-sectional comparison of results

Regarding the results for students in our sub-sample, who had attended MTI for at least one year ($N = 96$), we explored the importance of YMTI indirectly, by comparing the results of students in the early school years (Grades 1–3, ages six to nine years) with those of students in the middle school years (Grades 4–6, ages 10–12 years). In general, the older students had also attended MTI for more years. A grouping of participants into early and middle school is also motivated by the fact that MTI has specific teaching goals for each of these two stages within compulsory school (see above). As shown in Table 4, the differences in results between students in the early and the middle school years were statistically significant on all test measures in both languages, in favor of the older students.

Furthermore, the students in the middle school years scored consistently higher on the Swedish measures as compared to the same measures in Somali, whereas there were practically no differences between languages for students in the early school years, with the exception of the reading comprehension test where the younger students also scored better in Swedish than in Somali. One interpretation of these results is that the gap between the students' reading and vocabulary proficiencies in the two languages widens successively with time, in favor of Swedish.

Table 4: Comparison of results of students in the early school years with the results of students in the middle school years (rescaled scores from 0 to 100)

Measures	Early school years (Grades 1–3)		Middle school years (Grades 4–6)		Independent samples <i>t</i> -test			
	<i>N</i>	Mean (SD)	<i>N</i>	Mean (SD)	<i>t</i>	df	<i>p</i> <	Effect size (Cohen's <i>d</i>)
Vocabulary								
SwePPVT	35	68.17 (8.35)	60	80.18 (7.03)	-7.49	93	.001	-1.6
SomPPVT	36	67.98 (8.10)	60	76.89 (10.44)	-4.39	94	.001	-0.9
SweLexDepth	36	45.69 (12.69)	60	74.63 (11.56)	-11.44	94	.001	-2.4
SomLexDepth	36	46.80 (10.96)	60	56.10 (12.23)	-3.75	94	.001	-0.8
Reading								
SweWoCh	19	17.37 (9.72)	60	42.72 (14.07)	-7.31	77	.001	-1.9
SomWoCh	19	19.74 (15.33)	60	32.78 (14.18)	-3.43	77	.001	-0.9
SweReCo	19	48.85 (18.23)	60	75.57 (11.95)	-6.00	23 ^a	.001	-1.6
SomReCo	19	30.43 (14.65)	60	50.36 (13.31)	-5.56	77	.001	-1.5

Note. N.B. that when calculating the effect sizes in Table 4, we used corrected pooled SDs adjusted to the comparison of groups with different sample sizes (i.e. sometimes referred to as 'hedges *g*').

Swe = Swedish, Som = Somali, LexDepth = measure of lexical depth, WoCh = word chains, ReCo = reading comprehension.

^aEqual variances not assumed.

Table 5: Within and across language correlations between measures

	Swe- PPVT	SweLex- Depth	Swe- WoCh	SweRe- Co	Som- PPVT	SomLex- Depth	Som- WoCh
SwePPVT							
SweLexDepth	.85**						
SweWoCh	.69**	.74**					
SweReCo	.71**	.75**	.84**				
SomPPVT	.27**	.33**	.26*	.28**			
SomLexDepth	.33**	.34**	.25*	.31**	.70**		
SomWoCh	.43**	.44**	.58**	.58**	.52**	.49**	
SomReCo	.57**	.56**	.64**	.63**	.57**	.48**	.68**

Note. $N = 120$.

Swe = Swedish, Som = Somali, LexDepth = measure of lexical depth, WoCh = word chains, ReCo = reading comprehension.

* $p < .05$, ** $p < .01$.

5.3 Within and across language correlations

We investigated within and across language relationships between all measures, using the Pearson product-moment correlation coefficient. This was done with the large sample ($N = 120$), but the results were practically the same when conducted with the sub-sample ($N = 96$). Table 5 displays the correlations between our measures, showing moderate to relatively strong positive correlations between the measures within each language. This supports our construct validity, since measures of vocabulary breadth and depth should theoretically be correlated within each language (Vermeer 2001; Akbarian 2010), as should measures of vocabulary with reading (Anderson and Freebody 1981; Proctor *et al.* 2012; Alderson *et al.* 2015). In addition, we found positive correlations between all of our measures across languages, that is higher scores on each measure in Somali correlated with higher scores on each measure in Swedish. However, these across language correlations were stronger for the reading measures than the vocabulary measures.

5.4 Results of longitudinal data

As mentioned earlier, 46 of the participants in our sub-sample ($N = 96$) were tested on two different occasions in both languages, approximately one year apart (referred to as Time 1 and Time 2). Participants' results at Time 1 and Time 2 were compared using paired samples *t*-tests. The comparisons of results from the two data points are displayed in Table 6, which shows that participants performed significantly better at Time 2 as compared to Time 1 on all of

Table 6: Longitudinal results (rescaled scores from 0 to 100)

Measures	Paired samples statistics			Paired samples <i>t</i> -test			
		<i>N</i>	Mean (SD)	<i>t</i>	df	<i>p</i> <	Effect size (Cohen's <i>d</i>)
Swedish							
PPVT	Time 1	46	77.30 (8.92)	-8.78	45	.001	-1.3
	Time 2	46	81.63 (8.44)				
LexDepth	Time 1	46	55.59 (15.21)	-9.11	45	.001	-1.3
	Time 2	46	65.56 (13.39)				
Word chains	Time 1	40	36.29 (18.57)	-9.25	39	.001	-1.5
	Time 2	40	47.21 (18.99)				
Reading comprehension	Time 1	40	68.20 (19.52)	-7.99	39	.001	-1.3
	Time 2	40	80.39 (15.19)				
Somali							
PPVT	Time 1	46	72.64 (11.25)	0.26	45	.798	n.a.
	Time 2	46	72.17 (11.14)				
LexDepth	Time 1	46	46.21 (10.38)	-2.12	45	.05	-0.3
	Time 2	46	49.97 (11.27)				
Word chains	Time 1	40	27.29 (14.80)	-4.89	39	.001	-0.8
	Time 2	40	38.65 (18.99)				
Reading comprehension	Time 1	40	44.92 (16.79)	-1.49	39	.146	n.a.
	Time 2	40	49.77 (20.05)				

Note. N.B. that pupils who were in first grade at Time 1 were excluded from the paired comparisons of the two reading measures ($N = 6$).

LexDepth = measure of lexical depth, n.a. = not applicable.

the Swedish measures. For Somali, the direction of results also indicates progression, except on the PPVT. However, the differences in scores reached statistical significance only for Somali lexical depth ($p < .05$) and Somali word chains ($p < .001$). To explore the impact of YMTI in these results, we conducted two regression analyses for each of these two measures, where we in Model 1 controlled for participants' results at Time 1 in addition to their chronological age, AoA, sex, reported language use with parents, and reported Somali literacy use, and in Model 2 entered the variable YMTI. In short, the results showed that YMTI did not add statistically significant explanatory value to the change of results from Time 1 to Time 2, beyond the independent variables controlled for in Model 1.

6. DISCUSSION

Let us first address RQ1, 'Does MTI, in the way that it is organized in Sweden, contribute to children's vocabulary knowledge and reading proficiency in the

mother tongue?’ Based on the comparison of results from those who had attended MTI for more than one year with the results from those who had received no or little MTI, together with the results of the regression analyses presented above, we conclude that participation in Somali MTI appears to have a positive impact on participants’ proficiency in Somali, in particular for Somali reading comprehension. These results are noteworthy, considering the restricted time allocated for MTI and the subject’s marginalized role in Swedish schools. The results are in line with the findings of [Bylund and Díaz \(2012\)](#), who concluded that participation in Spanish MTI contributed positively to the Spanish grammatical knowledge of Spanish–Swedish bilinguals in Sweden. The positive impact of MTI is further supported by our observation that several of the participants who had not attended Somali MTI were struggling with the Somali tests, particularly the reading measures. Some of them were even unable to complete these tasks. We suspect that we might have seen a larger and wider effect of MTI had we been able to include more participants in our sample who had not attended any MTI. For example, we think this would have led to a statistically significant effect of MTI on the Somali vocabulary measures, at least for lexical depth. We also suspect that we would have found an even larger difference in results on reading comprehension, in favor of those who had attended MTI, if we had included a measure of text comprehension that required higher-order reading skills in addition to sentence reading comprehension (cf. [Cain et al. 2001](#)).

The results showed weaker impact of MTI on participants’ vocabulary proficiency in Somali. In terms of vocabulary breadth, this is perhaps unsurprising considering that most of the participants in this study have the opportunity to use Somali in their everyday lives, irrespective of whether they attend MTI. Their receptive vocabulary knowledge may therefore be less affected by lack of instruction than other more school-related competencies (cf. [Outakoski 2015](#)). As mentioned previously, research has shown that paradigmatic lexical competencies are affected positively by instruction ([Anglin 1985](#); [Snow et al. 1991](#)). Notwithstanding, we were not able to show inconclusively that MTI had an effect on participants’ Somali lexical depth in this study. One reason for this may be that although dimensions of vocabulary depth are explicit aims of the MTI syllabus in the middle and later school years ([Skolverket 2011](#)) and included in the teaching of MTI, earlier research has shown that MTI teachers tend to struggle to work explicitly and systematically with vocabulary within the instructional time allotted for MTI ([Ganuza and Hedman 2015](#)). This may be one reason why we do not see a significant impact of MTI on Somali vocabulary depth in our data. Another possibility is that our lexical depth measure, which is somewhat biased toward Swedish (see Section 4 above), does not represent vocabulary that is relevant enough to the MTI content, or that the Somali words included in the test are of a higher level of difficulty than the Swedish counterparts (cf. [Peña 2007](#)). The generally lower results on the Somali version of the lexical depth test ($M = 50.6$) in comparison with the Swedish version of the same test ($M = 61.7$) might be an indication of that. On

the other hand, it is also plausible that participants have weaker vocabulary depth knowledge in Somali than in Swedish because they have been schooled mainly through Swedish.

Regarding participants' results on the Somali word decoding test, it could not be concluded that MTI had an effect beyond the other independent variables controlled for, in particular not beyond participants' chronological age.

The results of our cross-sectional analyses indirectly indicate that students who participate in Somali MTI do develop both their reading and vocabulary proficiencies in Somali over time, as the students in the middle school years outperformed students in the early school years on all of the Somali measures, as well as on the Swedish measures. These results are significant, considering that one cannot assume that L1 literacy competencies will automatically develop or accumulate with time in a minority language context (Carreira and Kagan 2011; Kim and Pyun 2014). Instead, these competencies tend to be highly dependent on opportunities for L1 language and literacy use as well as access to L1 instruction (García 2009; Outakoski 2015). The results of the longitudinal data indicate, however, that it takes more than one year before clear evidence may be found of development of Somali vocabulary and reading skills for students who attend MTI. In contrast, we found distinct development on the same measures in Swedish after only one year, which may be expected considering the great difference in teaching time allocated for Somali and Swedish in school. For the same reasons, we were not surprised at the results that indicate an increased difference between participants' proficiency in Somali and Swedish over time, in favor of Swedish (Hyltenstam and Milani 2012; Kim and Pyun 2014).

With respect to RQ2, 'What is the relationship between students' vocabulary knowledge and reading proficiency in the mother tongue as compared with the stated proficiencies in the language of schooling', our results showed evidence of cross-linguistic interdependence of reading proficiency and vocabulary knowledge (cf. Ordóñez *et al.* 2002; Sheng *et al.* 2006; Geva and Genesee 2008; Alderson *et al.* 2015). Results on all of the measures in one language were positively correlated with results on all of the measures in the other language, but the correlations were weaker for vocabulary than for reading. As an example, higher scores on Somali reading comprehension were positively related to higher scores on Somali PPVT, Somali lexical depth, and Somali word decoding, as well as positively related to all of the same measures in Swedish. Hence, this study shows no evidence for L1 interference on L2 acquisition (Bylund *et al.* 2012). The overall results of this study even imply that participation in MTI may be beneficial not only for certain aspects of students' reading and vocabulary knowledge in the mother tongue but possibly also for equivalent competencies in the language of schooling. The results suggest that higher results on, for example, Somali reading comprehension might be able to predict higher results on all of the other measures in both languages. Such a claim, if it holds valid in future research, certainly underscores the importance of teaching, reading comprehension, and vocabulary

within MTI. At the same time, we want to clarify that we cannot assume causality based on these correlations, and we also have not controlled for the impact of, for example, participants' general cognitive ability as a possibly mediating factor in the results.

Notwithstanding, one pedagogical implication of the study is that MTI should include systematic teaching of vocabulary and reading, considering that even the limited attention that MTI teachers were able to give to explicit vocabulary and reading appeared to have an impact on students' literacy proficiencies in the mother tongue. Stronger gains could possibly be predicted if MTI was given more time, and if it was also better coordinated and integrated with the teaching of other subjects (cf. Pirinen 2015). Research from other contexts suggests that more MTI might be beneficial not only for students' bilingual development but also for their general school success (Thomas and Collier 1997; Schwartz and Katzir 2012; Ganuza and Hedman under review).

7. CONCLUSIONS AND FUTURE DIRECTIONS

In conclusion, the overall results are in line with our predictions, that is we found that participation in MTI contributed positively to participants' proficiency in the mother tongue, in particular for reading comprehension. These results are in agreement with earlier research that has shown that MTI has a positive impact on students' minority language proficiency (Skolverket 2008; Bylund and Díaz 2012), despite the restricted time allocated for it, and despite the known implementation problems. We also found evidence of cross-linguistic influence, particularly for measures of reading. That is, higher results on Somali reading were associated with higher results on reading and vocabulary in Swedish. Accordingly, these correlations indicate that MTI might have a positive impact also on vocabulary and reading in the language of schooling, albeit indirectly. This underscores the importance of providing instruction in the mother tongue for minority language-speaking children, even if it is restricted to only 40–60 min a week.

In future research, we would like to investigate the impact of MTI with a larger sample of bilingual subjects who do not currently attend MTI, and include more language pairs. We would also like to more thoroughly investigate the role of participants' home language and literacy practices, in addition to the role of MTI. Furthermore, it would be of interest to explore the relationship between participants' vocabulary knowledge and reading proficiency in the mother tongue and their general school results (Ganuza and Hedman under review).

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SUPPLEMENTARY DATA

Supplementary material is available at *Applied Linguistics* online.

NOTES

- 1 In line with Swedish language policy and practice, we have opted to use the term MTI instead of, for example, *heritage language education/support*, which is commonly used to refer to the teaching of minority languages in North American contexts.
- 2 These two restrictions do not apply to the five national minority languages Finnish, Jiddisch, Meänkieli, Romani, and Sámi.
- 3 N.B. that only the first 47 items on the Swedish version of the test were included in the calculations for internal consistency, as none of the participants completed more than these items. Incorrect or missing answers were set to 0 points (which was also done to calculate internal consistency on the reading comprehension tests).
- 4 In the regression analyses, participants' sex/gender was dummy-coded. Their reported Somali language use with parents was converted into a scale, as was their reported Somali literacy use (based on their reported frequency of multimedia use in Somali, reading in Somali, and writing in Somali). We did this by first turning their answers into z-scores, and then combining them into one scale for each of these two variables.
- 5 The independent variables in our study are correlated to varying extents. However, multicollinearity is not a matter for concern, since the VIF values never exceed 4 in any of the regression analyses conducted (Cohen Cohen West and Aiken 2003).

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