The Role of Word Reading and Oral Language Skills in Reading Comprehension in Syrian Refugee Children

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Abstract

Canada has resettled more than 57,000 Syrian refugees since 2015 (Government of Canada, 2017). However, little is known about refugee children's language and literacy development. The present study evaluated Syrian refugee children's performance on language and literacy measures in English and Arabic, and examined whether the Simple View of Reading (SVR) model is applicable in both of their languages. Participants consisted of 115 Syrian refugee children 6-13 years of age. They received a battery of language and literacy measures including word reading, vocabulary, oral narratives, and reading comprehension in both English and Arabic. Compared to the normative samples, refugee children performed poorly on English standardized measures. They also demonstrated difficulties in Arabic, as more than half of the children were not able to read in the language. Despite the relatively low performance, there was evidence to support the SVR model in both languages. In addition, oral language skills played a larger role in English reading comprehension in the older group than the younger group. This age-group comparison was not carried out in Arabic due to reduced sample size. Theoretical and practical implications of the findings are discussed.

Keywords: Simple View of Reading. Reading comprehension. Refugee children. Oral narratives

The Roles of Word Reading and Oral Language Skills in the Reading Comprehension of Syrian Refugee Children

More than half of Syria's population of 23 million has been displaced by the civil war in Syria. Since late 2015, Canada has resettled more than 57,000 Syrian refugees (Government of Canada, 2017). A large number of these refugees are children and adolescents, and many experienced interrupted schooling before their arrival in Canada (Sirin & Rogers-Sirin, 2015). It is well known that refugee children are susceptible to academic, psychological and social difficulties as a result of the challenges they experienced and continue to experience (Bronstein & Montgomery, 2011; Kalt, Hossain, Kiss, & Zimmerman, 2013; Tousignant et al., 1999). To support the full participation of refugee children and youth in their host country, it is essential to ensure that they acquire fluent language and literacy skills in the language of their host country, oftentimes their second language (L2), for academic achievement and social integration. Low proficiency in the language of the host country hinders access to services and compromises employability in refugees (e.g., Beiser & Hou, 2001). At the same time, it is important to maintain Arabic, their first (L1) and heritage language as it provides a sense of unity and belonging with family and community members (Tseng & Fuligni, 2000). The present study focused on the language and literacy skills of Syrian refugee children resettled in three metropolitan areas in Canada. These children were native speakers of Arabic who were learning English as their L2.

Limited empirical research has examined the levels of language and literacy achieved by the refugee population in a host country. Most of the available research is qualitative and focuses on role of L2 learning in acculturation (e.g., Schumann, 1978). In quantitative studies, self-report questionnaires are commonly used to obtain data concerning refugees' proficiency in the

language of the host country. For example, the Language, Identity and Behavioral Acculturation Scale (LIB, Birman & Trickett, 2001) evaluates refugees' ability to adapt to the new culture, with their L2 proficiency as a component of this adaptation process (Bankston & Zhou, 1997; Dodds et al., 2010; Portes & Schauffler, 1994; Trickett & Birman, 2005 among others). Further, teacher reports or GPA scores have been used as indicators of academic performance and school adaptation (Birman et al., 2002; Birman et al., 2005; Trickett & Birman, 2005). Although these tools provide useful information about refugee children's general academic achievement, little is known about their performance in specific linguistic and literacy domains such as vocabulary, oral language, word reading, and reading comprehension (Dunn & Tree, 2009; Jia et al., 2014; Li et al., 2006; Sparks, 2016). More detailed information on children's language and literacy skills is the first step toward helping them become proficient readers in both L1 and L2. Thus, the first goal of our study was to use carefully designed quantitative measures to evaluate Syrian refugee children's language and literacy skills. We compared the performance of the Syrian refugee children in our sample on English standardized measures to that of the normative sample; we further examined whether younger (6-9 years of age) and older (10-13 years of age) Syrian refugee children exhibit different levels of proficiency in English (L2) and Arabic (L1).

According to the highly influential Simple View of Reading (SVR) model, the skills and processes that underlie reading comprehension fall into two broad categories, decoding and language comprehension (Gough & Tunmer 1986; Hoover & Gough 1990). A child needs to master both sets of skills in order to achieve successful reading comprehension. Gough and colleagues propose that the relative influence of the two components changes over time. In the beginning stages of learning to read, decoding exerts a greater influence on reading comprehension. With time, word decoding becomes automatic, and language comprehension

plays an increasingly more important role in reading comprehension. The validity of the SVR model has been established by an extensive body of research in English (Gough & Tunmer, 1986; Kendeou et al., 2009; Oakhill & Caine, 2012; Vellutino et al., 2007) and confirmed in many other languages (Ho et al., 2019; Proctor et al., 2005; Tunmer & Chapman, 2012). There is preliminary evidence supporting the applicability of the SVR model among Israeli Arabic speakers (Asadi, Khateb, & Shany, 2017), though it has not been tested in Arabic-English bilingual children residing in an English-speaking country. Due to the dearth of research, the second goal of the present study was to explore whether the SVR model is applicable for Syrian refugee children in both English and Arabic. In addition, we explored the relative importance of decoding and oral language skills in reading comprehension in younger and older refugee children in English. A similar comparison, unfortunately, was not carried out in Arabic because less than half of the children in our sample were able to read in Arabic.

Factors Influencing Language and Reading Outcomes of Refugee Children

A substantial body of research has examined how long it takes English Language Learners (ELLs) to obtain native-like proficiency in English. With respect of oral language, it appears that children who have completed all of their schooling in English become generally proficient between grades 3 and 5, and approach native-like proficiency around grade 5 (e.g., Saunders & O'Brien, 2006; but see Paradis, 2016). However, language development is multifaceted. Cummins (2008) argues that while L2 learners may establish conversational fluency quickly, it takes five or more years to develop academic language proficiency because it is context-reduced and cognitively demanding. Studies have also shown that ELLs develop word reading, oral language, and reading comprehension skills at different rates. Compared to English L1 speakers (EL1), ELLs achieve comparable performance on phonological awareness and word

reading but experience a rather persistent delay in vocabulary. In a longitudinal study that evaluated 390 ELLs and 149 EL1s in G2 and then again in G5, Geva and Farnia (2012) observed no group differences in word level skills (e.g., phonological awareness, word reading accuracy and fluency) in either grade. In contrast, ELLs still lagged behind EL1s on oral language (e.g., vocabulary, syntax and listening comprehension) and reading comprehension skills by grade 5. Similar results were reported by Au-Yeung et al. (2015) for the English performance of ELLs and EL1s in French immersion programs[1]. The two groups of children performed similarly on English phonological awareness and word reading, but the ELLs were still behind on English receptive and expressive vocabulary by grade 3. Since the Syrian refugee children in our study had only resided in Canada for less than three years by the time of testing, we expected that they would score lower on oral language and reading skills compared to the normative sample.

An important factor among that affects L2 learning is age of acquisition (e.g., Paradis, 2007, 2016). Age of arrival in an English-speaking country has been found to be a consistent and robust predictor of long-term L2 attainment (Dekeyser et al., 2010; Granena & Long, 2013; Jia, 2003; Jia & Aaronson, 2003). For example, in a now classic study, Jia and Aaronson (2003) followed 10 native Chinese-speaking children and adolescents immigrated to the United States for three years. At the time of arrival, children of age 9 or younger spoke no English and the older ones (aged 10-16) had limited English proficiency. Within three years, however, all children in the younger group switched their language preference from the L1 to L2, whereas the older group maintained their preference for the L1 throughout this period. All of the participants in the present study arrived in Canada between the fall of 2015 and the summer of 2017, and had been in the country for less than three years at the time of the data collection. Based on the

[1] Children enrolled in Canadian French immersion programs received school instruction primarily in French starting in Senior Kindergarten.

findings of Jia and Aaronson (2003), it is of interest to explore whether younger and older Syrian refugees exhibit different patterns of development in the L1 and L2.

In addition to age of acquisition, factors such as socio-economic status (SES), emotional well-being, and interrupted schooling influence refugee children's language and literacy development. SES is linked to the amount of resources at home, the quality of language input, and the amount of time that parents spend on literacy activities (Hoff, 2006). The home environment of low SES families tends to be less linguistically stimulating (e.g., Hart & Risley, 1995) and low SES parents tend to be less responsive to their children due to competing demands (Hammer, & Miccio, 2006). The well-known SES effect in English-speaking children was recently observed in Arabic-speaking children in Israel (Arafat, Korat, Aram & Saiegh-Haddadj, 2017). There is also increasing evidence that SES is related to English proficiency for ELLs (Cobo-Lewis, Pearson, Eilers, & Umbel, 2002; Kieffer, 2010; Mancilla-Martinez & Lesaux, 2011a; Paradis, 2016). Compared to other ELLs, refugee children face additional challenges such as interrupted schooling and traumatic experiences, which negatively impact their success at school (e.g., Gagne, Al-Hashimi, Little, Lowen & Sidhu, 2018). Since the majority of the Syrian refugee children in the present study came from low SES families and some experienced interrupted schooling, their language and literacy performance may be adversely affected.

The SVR Model of Reading Comprehension

Reading comprehension is the ultimate goal of reading development. In addition to proficient oral language skills, successful reading comprehension is critical for full integration in society for refugee children. The SVR model defines reading comprehension as the product of two partially independent components: decoding and language comprehension (Gough & Tunmer, 1986; Hoover & Gough, 1990; Hoover & Tunmer, 1993). Each of the two components

can be further divided into a set of subskills (Roberts & Scott, 2006). Decoding requires "code-related skills", which may include phonological awareness, lexical access, and knowledge of grapheme phoneme correspondences. Language comprehension, on the other hand, may include vocabulary, morphology, syntax, and listening comprehension, all of which are related to reading comprehension (e.g., Carlisle et al., 1999; Hedrick & Cunningham, 1995; Lindsey et al., 2003; Proctor et al., 2005; Royer & Carlo, 1991).While oral narration requires children to generate or retell stories and are considered expressive language skills, these skills fall into the broader category of oral language proficiency and have been shown to contribute to reading comprehension (e.g., Hipfner-Boucher et al., 2016). Since the SVR model was first proposed, its validity for explaining English comprehension has been confirmed by studies involving both EL1s (Gough & Tunmer, 1986; Kendeou et al., 2009; Oakhill & Caine, 2012; Vellutino et al., 2007) and ELLs (Gottardo & Mueller, 2009; Hoover & Gough, 1990; Proctor et al., 2005; Tunmer & Chapman, 2012), although the subskills were measured somewhat differently across studies.

Notably, the influence of decoding and language comprehension on reading comprehension changes over time in the SVR model (Florit & Cain, 2011; Gough and Tunmer 1986; Hoover and Gough 1990). In the early grades, the level of reading comprehension is restricted by children's decoding abilities. This is because children have yet to acquire decoding skills, and the texts they read at this time are relatively simple. As decoding skills develop, reading comprehension becomes more strongly associated with language comprehension (Catts, Hogan, & Adlof, 2005; Gough & Tunmer, 1986; Hedrick & Cunningham, 1995; Wingerden et al., 2018). The complex texts children read in higher grades require more advanced knowledge of vocabulary, morphology, syntax, etc. to achieve full comprehension. This shift is particularly

important for ELLs because they typically master code-related skills rather quickly, but take much longer to acquire oral language skills (Geva & Farnia, 2012; Verhoeven & Leeuwe, 2012).

Although the SVR model has been verified in many different orthographies (e.g., Spanish, French, Dutch, Italian, etc. for a review, see Florit & Cain, 2011), the evidence in Arabic is very limited. Vowelized Arabic is a shallow orthography in that there are regular correspondences between graphemes and phonemes (Elbeheri & Everatt, 2007). However, because Arabic short vowels are presented as diacritical marks in vowelized texts only, non-vowelized Arabic is a deep orthography with a large number of homographic words (Elbeheri & Everatt, 2007). For example, /madrasah/ (مَدْرَسَه) *school* and /mudarisah/ (مُدَرّسَه) *teacher* have the same consonants but different short vowels. Arabic-speaking children initially learn to read vowelized texts and they transition to non-vowelized texts around grades 3 and 4 (Mahfoudhi, Everatt, & Elbeheri, 2011). Another feature of the Arabic orthography is "ligaturing", meaning connecting of letters (Tibi & Kirby, 2018). The same letter changes shape depending on its position in a word. For example, the consonant (h) in Arabic(ه) can be / hadiah/ (هدية) at the beginning of a word, / nahir/ (نهر) in the middle, and /itijah/ (اتجاه) in the final position. Additionally, there are six non-connecting letters, which create space within the same word (Mahfoudhi, Everatt, & Elbeheri, 2011). Due to these features, even vowelized Arabic is considered by some to be only semitransparent (e.g., Abdelhadi, Ibrahim, & Eviatar, 2011; Abu-Rabia, Share, & Mansour, 2003; Tibi & Kirby, 2018).

Previous studies have shown that both code-related skills (e.g., Asaad & Eviatar, 2014; Layes et al., 2015; Mannai & Everatt, 2005; Taibah & Haynes, 2011; Tibi & Kirby, 2018) and oral language skills contribute to reading comprehension (Farran, Bingham, & Matthews, 2012; Tibi & Kirby, 2018) in Arabic-speaking children. With respect to code-related skills, Tibi and

Kirby (2018) demonstrated that phonological awareness and RAN were unique predictors of vowelized word reading and reading comprehension in third-grade Arabic speakers after controlling for age, nonverbal reasoning, and vocabulary. These findings are consistent with the notion that vowelized Arabic is largely a transparent orthography, although features such as allography, ligaturing, and diglossia add to its orthographic depth. Relatedly, studies also found that Arabic-speaking dyslexics were impaired in phonological processing and decoding skills (Abu-Rabia, Share, & Mansour, 2003; Elbeheri & Everatt, 2007). With respect to oral language skills, Tibi and Kirby (2018) reported that vocabulary was uniquely related to reading comprehension after controlling for age, non-verbal reasoning, phonological awareness, and RAN. Farran et al., (2012) observed that vocabulary contributed to reading comprehension after controlling for phonological awareness and morphological awareness in both English and Arabic in a combined sample of Arabic-English bilinguals enrolled in grades 3, 4, and 5. Neither study, however, included word reading in the model predicting reading comprehension. In a large concurrent study involving Israeli Arabic-speaking children from grades 1 to 6, Asadi et al. (2017) found that both decoding and listening comprehension were associated with reading comprehension across the grades. While the contribution of decoding decreased from grades 1 to 3, the contribution of listening comprehension increased across the same grades. This study supports the applicability of the SVR model in Arabic.

The Present Study

To recapitulate, the present study has two goals. The first goal was to assess Syrian refugees' language and literacy performance in English and Arabic. The performance on English standardized measures was compared to that of the normative sample for the overall sample as well as the younger and older groups. Our sample had resided in Canada for less than three years

by the time of the study. Due to the relatively short time in Canada, their low levels of SES and parental education, and the vulnerable nature of the refugee population, their performance was expected to be below average on word reading, vocabulary, and reading comprehension. They may also experience difficulties in acquiring Arabic due to interrupted schooling and low SES/parental education. Standardized measures, however, were not available in Arabic. Given that age of acquisition affects the relative proficiency levels in the L1 and L2 (e.g., Paradis, 2007, 2016), we explored whether younger (6-9 years of age) and older (10-13 years of age) refugee children exhibit different levels of proficiency in English and Arabic by comparing the performance of the two groups on all measures.

The second goal was to assess the applicability of the SVR model in English and Arabic in Syrian refugee children. We calculated regression models to examine whether decoding, vocabulary, and oral narration skills each explain unique variance in reading comprehension after controlling for age and nonverbal reasoning. Notably, we assessed not only language comprehension but oral production in our study to gain a comprehensive understanding of refugee children's language skills and the contribution of these skills to reading comprehension. We predicted that both decoding and language skills would contribute to reading comprehension in English, as observed with ELLs in previous studies. However, word reading may play a bigger role than language skills due to refugee children's low levels of reading proficiency. The same patterns of results may be found for Arabic reading comprehension. In English only, we compared the relative contributions of decoding and language skills to reading comprehension in younger (6-9 years) versus older (10-13 years) children. Based on previous research, we expected that language skills would play a more important role in reading comprehension in the

older group. We did not carry out a similar comparison in Arabic due to a reduced sample size---less than half of the sample were able to complete the reading measures in Arabic.

Method

Participants. Initially 133 Syrian refugee children aged 6-13 years old were recruited from 73 families[2] residing in three cities in Canada: Toronto, Waterloo, and Edmonton. All families arrived in the country between late 2015 and summer 2017. All children were enrolled immediately in public schools upon arrival. By the time of testing, the children had been exposed to English for 3-30 months. Because our participants had varied levels of proficiency in Arabic and English, some of them were not able to complete the testing batteries in either or both languages. As a result, 115 children (54 males, mean age=9 years, 3 months) were included for the analysis of the English data, with 60 from Toronto, 32 from Edmonton, and 23 from Waterloo. Among the 115 children, only 57 participants (25 males, mean age = 10 years, 6 months) were able to read in Arabic and were included in the analysis of the Arabic data, with 35 from Toronto, 11 from Edmonton, and 11 from Waterloo.

Measures. All children were tested in the spring semester of their academic year. They received a battery of measures in English and Arabic. The ALEQ questionnaire was given in Arabic only, whereas non-verbal reasoning was assessed in English only. All the other measures were given in both languages.

ALEQ-4 Questionnaire. Demographic information about family background, refugee camp experience before arriving to Canada, child's language learning background and home literacy activities in both languages were collected through the ALEQ-4 questionnaire (Paradis, Soto-Corominas, Chen, X., & Gottardo, in press-a). The questionnaire was given to mothers of

[2] Only 12 families were privately sponsored, the rest were assisted by the Canadian government.

the participating children in a face-to-face interview in Arabic. According to the questionnaire, about 68% of the children received formal instruction in Arabic either in Syria before the war, or in neighboring countries (e.g., Jordan, Lebanon, Turkey, and Egypt) after they left Syria and before they arrived in Canada. Approximately 32% (n=43) (22 males) of the refugee children had interrupted education before arriving in Canada. With respect to maternal education, 21% of the mothers finished university education, 32% received secondary education, and 42% had primary education. The rest chose not to report their levels of education.

Nonverbal Reasoning. Nonverbal reasoning was measured using the Matrix Analogies Test (Naglieri, 1985). To save time, only two subtests, Reasoning by Analogy, and Spatial Visualization were included. Each subtest consisted of 16 items of increasing difficulty. For each item, the child was asked to choose one of six patterns that best complete the given matrix. The test was stopped after four consecutive errors. The Cronbach's α was .87 for this test.

Word Reading. English word reading was assessed by the letter-word identification subtest of the Woodcock-Johnson III Tests of Achievement (Woodcock, McGrew, & Mather, 2001). The test consisted of 76 items with increasing difficulty. The child was asked to read each item aloud, and testing stopped when the student responded incorrectly to six consecutive items on the same page. The Cronbach's α for this test was .96. Arabic word reading was evaluated with a similar task created by Tibi (2016). The Arabic task consisted of 10 practice items and 90 vowelized words that gradually increased in difficulty. The task was stopped after the child failed ten words in a row. The Cronbach's α for this task was .99.

Vocabulary. English receptive vocabulary was measured with the fourth edition of the Peabody Picture Vocabulary Test (PPVT; Dunn & Dunn, 2007). This test contained 228 test items of increasing difficulty. For each item, the examiner orally presented a word and the child

was asked to point to one of four pictures that best represented the given word. The test was discontinued after the child failed eight consecutive items. Arabic receptive vocabulary was assessed with the vocabulary subtest from the Arabic Language Assessment Battery (ALAB, Asadi, Shany, Ibrahim, Khateb, & Ben Simone, 2015). This test had a total of 73 items and followed the same procedure as the PPVT. The Cronbach's α for this test was .90.

Oral Narratives. English narrative skills were assessed with a shortened version of the Test of Narrative Language (TNL, Gillam et al., 2004). For narrative comprehension, one narrative story (*The Treasure*) was presented aurally to the child along with a picture. The child was asked to answer 12 literal and inferential questions after listening to the story. The child's responses were recorded for later scoring. The Cronbach's α for this task was .75.

For oral narrative production, the child was presented with another picture (*Aliens*). The child was asked to look at the picture carefully and to tell a story that was as long and as complete as possible. The child's story was recorded for transcription and scoring. After transcription, the child's story was scored on story content and story complexity. Story content reflected the setting/characters of the story, the beginning of the story, actions-reactions between the characters of the story, and the sequence/ending of the story. Story complexity was evaluated on conjunctions (temporal and causal relationships), sentences (grammaticality and inclusions of dialogue), and story (whether the story made sense, story completeness and complexity). This task had a total of 24 items and the Cronbach's α alpha was .98.

The English tasks were translated into Arabic to assess Arabic narrative skills. The same pictures were used and the same testing procedures were followed. The Cronbach's α for Arabic narrative comprehension was .76, and the Cronbach's α for Arabic narrative production was .82.

Reading Comprehension. English reading comprehension was assessed using the

passage comprehension measure in the Woodcock-Johnson III Tests of Achievement (Woodcock, McGrew, & Mather, 2001). This cloze test required the child to read a sentence or a short passage silently and fill in the blank with the most appropriate word by saying it aloud. The test consisted of 47 items that gradually increase in difficulty. The Cronbach's α for this test was .91. Arabic reading comprehension was assessed with a task that consisted of two components. The first component was a sentence reading task adapted from Assadi et al. (2015). There were two practice items and 10 test items. Each item contained three sentences and one picture. The child was asked to read the sentences and choose the one that best represented the picture. The second component was a passage reading task taken from Mahfoudi (2010). In this part, the child read short passages that gradually increased in difficulty and answered several multiple-choice questions related to each passage. Each question had four options. There were two practice and six test passages, with a total of 32 questions. The child was given 25 minutes to complete both components of the Arabic reading comprehension task. The Cronbach's α for this task was .95.

Procedure. Testing occurred in two sessions in either the child's school or home. All measures were administered individually by trained research assistants highly fluent in English or Arabic. One session was given in each language, and each testing session lasted about 60 minutes. An additional session was added if a child was not able to complete all the tasks within the given time. Language of testing was counterbalanced for all children.

Results

Table 1 displays the descriptive statistics of the English measures for the overall sample and for the younger (6-9 years old) and older (10-13 years old) groups. All variables were checked for skewness and kurtosis. For the overall sample and the older group, all variables were normally distributed. For the younger group, nonverbal reasoning was positively skewed. This

variable was then transformed using the log function (+1), as the data contained some zero scores (Tabachnick & Fidell, 2007). All further analyses for the younger group were performed with the transformed variable. All analyses (t-tests, correlations, and regressions) for both the younger and older groups were carried out using raw scores. As shown in Table 1, a series of t-tests were calculated to compare the two groups on all English measures. The older group performed significantly higher than the younger group on nonverbal reasoning, word reading, TNL comprehension, and reading comprehension. However, the groups did not differ on PPVT or TNL production.

[Insert Table 1 here]

Standard scores are displayed in Table 1 for three standardized English measures, word reading, vocabulary, and reading comprehension. For the combined sample, refugee children scored between 1-2 standard deviations below the mean on word reading (SS = 78.48), but more than two standard deviations below the mean on receptive vocabulary (SS = 58.10) and reading comprehension (SS = 59.59). When standard scores were calculated separately for the younger and older groups, we found the same patterns for the younger group. They scored around one standard deviation below the mean on word reading (SS= 83.85), more than two standard deviation below the mean on receptive vocabulary (SS= 64.88), and two standard deviation below the mean on reading comprehension (SS= 69.70). Standard scores for the older group reveal that they were close to two standard deviations below the mean on word reading (SS = 70.47), and more than three standard deviations below the mean on receptive vocabulary (SS = 48.49) and reading comprehension (SS = 45.45). Thus, while the patters were similar for the two groups, the gap was wider for the older group.

Correlations among all English variables for the overall sample are presented in Table 2.

As displayed in Table 2, Reading comprehension was significantly associated with all variables. Correlations among all English variables for the younger and older samples are displayed in Table 3. Again, reading comprehension was significantly correlated with all the variables for both younger and older children.

[Insert Table 2 here]

[Insert Table 3 here]

To examine the relative contributions of English word reading and English oral language skills (receptive vocabulary, TNL comprehension, and TNL production) in English reading comprehension, two hierarchical regressions were performed on the whole sample. As shown in the left panel of Table 4, the first three steps were the same in both regressions: Children's age and nonverbal reasoning ability were entered in Step 1, followed by word reading in Step 2, and receptive vocabulary in Step 3. In the first regression, TNL comprehension was entered in the fourth step, whereas in the second regression, TNL production was entered in the fourth step. Age and nonverbal reasoning accounted for 31% of the variance in English reading comprehension, word reading 44% of the variance, and receptive vocabulary 6.8% of the variance. TNL comprehension did not explain any additional variance above the variables entered in the first three steps. This model accounted for 81.8% of the variance in English reading comprehension. Both word reading and receptive vocabulary were unique predictors. In the second regression, TNL production, entered in the fourth step, explained about 1.1% of additional variance in English reading comprehension. Word reading, receptive vocabulary, and TNL production were all significant unique predictors in this model, which explained 82.9% of the variance in English reading comprehension.

[Insert Table 4 here]

The middle panel of Table 4 displays two hierarchical regressions for the children in the younger group. The two models contained the same variables as the regressions for the overall sample in the first three steps. TNL comprehension and TNL production were entered in the final step of the two models respectively. Age and nonverbal reasoning, word reading, and receptive vocabulary accounted for 32.2%, 43.5%, and 4.7% of the variance in English reading comprehension respectively. Neither TNL comprehension nor TNL production explained any additional variance above the variables entered in the previous steps. Both models accounted for 80.4% of the variance in English reading comprehension. Only word reading and receptive vocabulary were unique predictors in the models.

Finally, the right panel of Table 4 shows the two hierarchical regressions for the children in the older group. These two models also contain the same control variables entered as the regressions for the overall sample in the first three steps. The last steps of the models were TNL comprehension and TNL production, respectively. Age and nonverbal reasoning, word reading, and receptive vocabulary accounted for 15.5%, 52.2%, and 12.7% of the variance in English reading comprehension respectively. TNL comprehension did not explain additional variance above the variables entered in the previous steps. In this model, only word reading and receptive vocabulary were unique predictors of English reading comprehension. This model explained 80.4% of the variance in English reading comprehension. Notably, in a second model, TNL production was a significant unique predictor of English reading comprehension, explaining close to 2% of the variance. This model explained 82.3% of the variance in English reading comprehension, with word reading, receptive vocabulary, and TNL production as unique predictors.

The means and standard deviations of the Arabic measures for the overall sample are

shown in Table 5. Because many students were not able to complete the Arabic measures, only 57 children were included in this analysis. The data was checked for skewness and kurtosis. With the exception of the Arabic word reading task, all measures were distributed normally. We carried out a log transformation on the scores of the Arabic word reading task following Tabachnick and Fidell (2007). All further analyses were performed with the transformed variable. The descriptive statistics of the younger and older groups are also presented in Table 5. A series of t-tests were carried out to compare the two groups on all of the measures. The older group outperformed the younger group on all of the Arabic measures.

[Insert Table 5 here]

Correlations among all variables for the combined sample are presented in Table 6. Reading comprehension was strongly associated with all variables. Correlational and regression analyses were not performed for the younger vs. older groups due to the small number of children in each group.

[Insert Table 6 here]

We then carried out two hierarchical regressions to examine the predictors of reading comprehension in Arabic (Table 7). The first three steps were the same in both regressions. Children's age and nonverbal reasoning were entered in Step 1, followed by word reading in Step 2, and receptive vocabulary in Step 3. In the first regression model, TNL comprehension was entered in the last step. In the second model, TNL production was entered in the last step. As shown in Table 7, age and nonverbal reasoning accounted for 35.9% of the variance in Arabic reading comprehension. Arabic word reading and Arabic vocabulary explained 29.7% and 4% of the variance in Arabic reading comprehension respectively. Neither Arabic TNL comprehension nor Arabic TNL production added any additional variance (< 1%) to Arabic reading

comprehension. Both models accounted for 69.6% of the variance in Arabic reading comprehension. Arabic word reading was a unique predictor and Arabic receptive vocabulary was a marginally significant unique predictor in both models.

[Insert Table 7 here]

Discussion

The first goal of the present study was to use quantitative measures to evaluate Syrian refugee children's language and literacy skills in both English and Arabic. We observed that the children, particularly those in the older group, performed poorly on the three English standardized measures (vocabulary, word reading, and reading comprehension) compared to the norming populations. These comparisons, however, must be interpreted with caution because the norming populations only included EL1 children, and our sample was within their first three years of learning English (Paradis, 2016). The children also struggled in Arabic, as more than half were not able to complete the reading measures. The second goal was to examine the applicability of the SVR model in English and Arabic. There was strong evidence supporting the model in English and Arabic as word reading and oral language skills were related to reading comprehension in both languages. Moreover, consistent with previous research, oral language skills became more important for reading comprehension in the older group than the younger group in English. This comparison was not carried out in Arabic.

Language and Reading Outcomes

To our knowledge, this was one of the first studies to assess refugee children's language and literacy skills with standardized and specifically designed experimental measures. Previous research on refugee children often relied on self-report data, which led to over- or under-estimation of proficiency levels (e.g., Wilkinson, 2002). Generally speaking, our English battery

indicates that refugee children had very low levels of English proficiency. To begin with, only 86% (115 out of 133) of the children completed the English battery. About 14% of our sample were not able to read in English. Because three of the English measures (word reading, vocabulary, and reading comprehension) were standardized, we compared refugee children's performance to that of the norming population. While ELLs examined by previous studies typically performed well on code-related skills (e.g., Geva & Farnia, 2012; Lesaux & Siegel, 2003; Muter & Diethelm, 2001), our sample performed more than one standard deviation below the mean on English word reading, suggesting that refugee children face more severe challenges than other ELLs in literacy development. On the other hand, we must keep in mind that our refugee sample had only been in Canada for less than three years, and studies with other ELLs typically involved children who were born in the host country or have lived there for a longer period of time. Thus, lower performance does not necessarily imply a developmental deficit. With respect to English receptive vocabulary, refugee children's performance was more than two standard deviations below the mean, which placed them at the bottom 5% of the population. Since both word reading and vocabulary are critical for reading comprehension, it is not surprising that refugee children were also severely challenged in reading comprehension, scoring more than two standard deviations below the mean of the normative sample.

Because our Arabic measures were not standardized, we cannot compare the performance of our sample to a norming population. However, the fact that only 43% (57 out of 133) of the children completed the Arabic battery suggests that more than half of the children did not have reading skills in their L1. This is consistent with the demographic information reported in the ALEQ-4 questionnaires. About one third of our sample experienced interrupted schooling before they arrived in Canada. Paradis, et al. (same issue) reported that these refugee children had more

schooling on average in English in Canada than schooling in Arabic, although they had been in Canada for less than three years. Apparently interrupted schooling had negatively impacted their language and literacy skills in Arabic. Interestingly, Paradis et al. (same issue) also found that refugee children spent significantly more time reading and writing in English than in Arabic. This unexpected imbalance may reflect cultural practices that emphasize oral traditions (Rouchdy, 2013).

The low levels of proficiency in English and Arabic are likely caused by a number of factors, including the amount of exposure to each language, SES and parental education, and richness of home environment (Paradis, 2007, 2016; Paradis et al., the same issue). The refugee children in our study had only resided in Canada for less than three years, and therefore their exposure to English was limited. Research has shown that it takes at least five years for ELLs to establish English proficiency (Cummins, 1981; Saunder & O'Brien, 2006). Compared to other ELLs, the refugee children in our sample faced many additional challenges. They came from low SES families with low levels of parental education. Although Arabic was spoken exclusively at home, there were few literacy activities in Arabic (Paradis et al., same issue). Interrupted schooling also led to poor language and literacy skills in Arabic. Finally, many children in this sample showed signs of emotional trauma inflicted by the war and by adversity in the migration experience (Vitoroulis et al., 2019; Soto-Corominas et al., 2019). While it is beyond the scope of the present study, future research should examine the effects of SES and socio-emotional well-being on language and literacy development in refugee children.

Comparing the younger and older groups reveals potential developmental trends about the refugee population. In English, the older group outperformed the younger group on nonverbal reasoning, word reading, TNL comprehension, and reading comprehension, while no

group differences were found on receptive vocabulary and TNL production. Considering that ELLs typically master decoding skills fairly quickly (e.g., Geva & Farnia, 2012; Lesaux & Siegel, 2003; Muter & Diethelm, 2001), it is not surprising that the older group was more advanced on English word reading than the younger group. Given the important role of word reading in reading comprehension for beginning readers, stronger word reading skills also led to better reading comprehension in the older group (see detailed discussion in the next section). In contrast, the older group experienced persistent difficulties in both receptive and productive language, again confirming previous findings that ELLs take much longer to develop oral language skills than word reading skills (e.g., Geva & Farnia, 2012; Mancilla-Martinez & Lesaux, 2011b). Notably, although the older group obtained higher raw scores than the younger group on some of the measures, they were further behind on standard scores on all standardized measures. The older group began to acquire English at a later age and the demand on language was greater in higher grades. As such, the older group experienced more challenges in language learning than the younger group.

When we compared the younger and older groups in Arabic, we found that older group outperformed the younger group on all of the measures. Since all children arrived in Canada roughly around the same time and primarily spoke Arabic at home, the older group had had more time and opportunities to acquire language and literacy skills in Arabic, leading to better performance. These findings point to resilience in refugee children---they are able to continue to acquire L1 skills despite adverse factors such as interrupted schooling and low richness of the L1 environment (Paradis et al., same issue). These patterns are consistent with those observed by previous studies comparing younger and older ELLs (e.g., Jia, 2003; Jia & Aaronson, 2003).

Thus, compared to younger refugees, older refugees encounter greater difficulties in English acquisition but they excel in L1 maintenance.

The SVR Model

The second goal of the present study was to examine the applicability of the SVR model in refugee children. We found strong evidence supporting the model in both English and Arabic. In English, our results on the overall sample showed that both word reading and receptive vocabulary were significant unique predictors of English reading comprehension, confirming findings of previous studies involving ELLs. Thus, despite the fact that refugee children may have lower reading skills than other ELLs reported in previous studies, predictors of English reading comprehension remain the same. Notably, word reading was a much stronger predictor of reading comprehension than oral language skills in refugee children, suggesting that these children were still in the beginning stages of reading development. Interestingly, TNL production added a small but significant amount of variance to English reading comprehension in the overall sample. The majority of studies examining the SVR model use receptive vocabulary as an indicator of oral language skills (e.g., Braze, et al., 2016; Joshi, 2005). Our results suggest that adding expressive language skills, even in the early stages of reading development, improve reading comprehension models. However, our results also showed that the role of expressive language skills in reading comprehension was larger in the older group than the younger group. This point will be discussed below when we compare the SVR models between the two groups.

Our findings also support the applicability of the SVR model in Arabic. We found that Arabic word reading was a strong predictor of Arabic reading comprehension. In contrast, Arabic vocabulary was only a marginally significant predictor and narrative skills did not contribute any additional variance to the model beyond word reading and vocabulary. The

relative contributions of these variables confirm that the refugee children in our sample were beginning learners of Arabic who primarily relied on word-level skills for reading comprehension. As children become more proficient readers in Arabic, we expect that receptive and productive language skills will play increasingly larger roles in reading comprehension. Taken together, our study provides evidence supporting the SVR in Arabic, a language that has rarely been explored in previous studies, and highlights universal processes in reading development across different orthographies.

It is noteworthy that our reading comprehension models explained high percentages of variance in reading comprehension in English (more than 80%) and in Arabic (close to 70%). On the one hand, these findings indicate quantitative measures are useful for assessing refugee children's literacy skills in both English and Arabic. As there are still relatively few language and literacy measures available in Arabic, more measures need to be developed, and with careful consideration of different developmental levels (e.g., immigrants vs. refugees) and unique linguistic features. Standardized measures in English produce standard scores, which allow us to gauge the performance of our sample in relation to that of the normative sample. However, standard scores must be interpreted with caution because they are derived from monolingual English-speaking children. On the other hand, the unusually high amounts of variance explained by these models indirectly support our observation of impoverished home literacy environment. Due to low SES and low parental education and perhaps also their unique migration experience, the refugee children had very limited literacy activities at home. As a result, the main sources of individual differences in reading comprehension came from linguistic and cognitive variables, rather than home environment factors. This is particularly the case in English, as the refugee

children received school instruction only in English[3]. Our findings point to the need of increasing support to refugee children not only at school but also in the home.

We further divided the children who completed the English battery into a younger group and an older group to compare the relative contributions of English word reading and oral language skills to English reading comprehension between the two groups. As expected, receptive vocabulary explained more variance in the older group (12.7%) than the younger group (4.7%). In addition, expressive language skills as measured by TNL production were a significant predictor of reading comprehension only in the older group. Thus, the developmental patterns observed in refugee children converge with those of English L1 and ELL children reported in previous studies ---the role of oral language skills increases as children become more experienced readers (e.g., Florit & Cain, 2011). However, it should be noted that word reading was still the strongest predictor of reading comprehension in the older group, explaining more than 50% of the variance. These patterns suggest that refugee children follow a similar, albeit much delayed, developmental trajectory compared to less vulnerable populations, and highlight the need to provide additional support to accelerate their development.

The findings of the present study must be interpreted with its limitations in mind. First, with a concurrent design, the comparisons between the younger and older groups only yielded preliminary findings, which need to be confirmed by longitudinal studies. Relatedly, we were only able to examine the SVR model in younger versus older groups in English because many refugee children lacked literacy skills in Arabic. This points to the importance of L1 maintenance in addition to English acquisition. Second, while we compared the performance of the refugee children to that of other ELLs reported in previous studies, these children were not matched,

[3] None of the refugee children participated in after-school Arabic heritage language programs.

other than the fact that both groups were immigrants and learning English as the L2. Future research should carry out direct comparisons between refugees and ELLs matched on cognitive and demographic variables and assessed with the same battery of measures. Third, although refugees represent a more vulnerable population than ELLs, we were not able to empirically examine risk factors such as low SES, interrupted schooling, and traumatic experience because these attributes were not evenly distributed in our sample. Future studies need to explore the effects of these factors on learning outcomes in refugee children. Fourth, government assisted and privately sponsored refugees demonstrate very different profiles in that the latter group tends to have higher SES and less traumatic experience (e.g., George, 2010). We were not able to make this distinction in the present study due to the small number of privately sponsored refugees in our sample. Future studies should examine the two groups separately. Finally, our sample only included Syrian refugee children who were resettled in Canada between 2015 and 2017. Therefore, our findings may not be generalized to refugees from diverse linguistic and ethnic backgrounds.

To conclude, the present study was one of the first studies to examine Syrian refugee children's language and literacy development with quantitative measures in both English and Arabic. We found that the refugee children performed poorly in both languages (e.g., in some cases two or three standard deviations below the normative mean), and many of them were unable to read in either language. However, this low performance of Syrian refugee children must be interpreted together with their unique experience. They have only been residing in Canada for less than three years, most came from low SES families and many had adversity in their pre-migration experiences. In this context, low performance does not necessarily point to neurological deficits in language and literacy development. Despite the low performance, word

reading and oral language skills were related to reading comprehension in both L1 and L2, supporting the applicability of the SVR model in both languages. In English, we also found that oral language skills played a more important role in the older group as compared to the younger children, although word reading was still the stronger predictor in the older group. It seems then that refugee children follow a developmental trajectory that is similar to that of other ELLs, but their trajectory is delayed due to their low levels of proficiency. Taken together, our findings underscore the urgent need to support refugee children's language and literacy skills in the L1 and L2, and at school and in the home.

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Table 1. *Descriptive statistics for English measures.*

Variable (No. of Items)	Combined (N=115)		Younger Group (N= 67)		Older Group (N=48)		t
	M	SD	M	SD	M	SD	
Age (months)	111.84	23.16	95.57	13.63	134.90	11.07	
Nonverbal reasoning (32)	8.46	5.74	6.73	4.64	10.92	6.27	4.433***
Word reading (76)	31.24	12.50	27.10	11.66	37.12	11.32	4.940***
Standard Scores	78.48	18.75	83.85	16.02	70.47	19.34	
PPVT (228)	73.48	26.23	70.00	23.76	78.41	28.41	1.839
Standard Scores	58.10	17.67	64.88	14.05	48.49	17.93	
TNL comprehension (12)	5.30	3.07	4.70	2.92	6.16	3.11	2.616**
TNL production (24)	7.54	4.85	7.00	4.77	8.23	4.92	1.387
Reading comprehension (47)	15.09	6.61	13.17	6.04	17.70	6.49	4.094***
Standard Scores	59.59	22.58	69.70	18.02	45.45	20.72	

**$p < .01$, ***$p < .001$.

Table 2. *Correlations among English variables for the overall sample.*

Variable	1	2	3	4	5
1. Nonverbal reasoning					
2. Word reading	.53**				
3. PPVT	.29**	.61**			
4. TNL comprehension	.40**	.59**	.63**		
5. TNL production	.37**	.56**	.59**	.56**	
6. Reading comprehension	.47**	.86**	.73**	.61**	.62**

**$p < .01$., ***$p < .001$.

Table 3. *Correlations among English variables for the younger (above the diagonal) and older (below the diagonal) groups*

Variable	1	2	3	4	5	6
1. Nonverbal reasoning	-	.25*	.48**	.35**	.27*	.46**
2. PPVT	.27*	-	.62**	.68**	.63**	.70**
3. Word reading	.46**	.61**	-	.57**	.50**	.87**
4. TNL comprehension	.36*	.55**	.56**	-	.60**	.61**
5. TNL production	.45**	.53**	.67**	.50**	-	.58**
6. Reading comprehension	.36**	.78**	.82**	.57**	.69**	-

**$p < .01$., ***$p < .001$.

Table 4. *Hierarchal linear regression predicting English reading comprehension*

	Overall Sample			Younger Group			Older Group		
Step/ Predictor	ΔR^2	Model with TNLC	Model with TNLP	ΔR^2	Model with TNLC	Model with TNLP	ΔR^2	Model with TNLC	Model with TNLP
1. Age	.310***	.013	.031	.322***	-.049	-.047	.155*	.067	.094
NV		.025	.008		.077	.076		-.022	-.053
2. WR	.440***	.633***	.594***	.435***	.674***	.668***	.522***	.520***	.428***
3. PPVT	.068**	.326***	.287***	.047***	.250**	.221**	.127***	.450***	.429***
4. TNLC	.000	.018		.001	.052		.001	.404	
4. TNLP	.011**		.134*	.007		.107	.019*		.197*

Note: NV: Nonverbal reasoning, WR: word reading, TNLC: TNL comprehension, TNLP: TNL production. *$p < .05$, **$p < .01$, ***$p < .001$.

Table 5. *Descriptive statistics for Arabic measures*

Variable (No. of Items)	Combined (N=57)		Younger Group (N= 18)		Older Group (N=39)		t
	M	SD	M	SD	M	SD	
Age (months)	111.84	23.16	95.57	13.63	134.90	11.07	
Nonverbal reasoning (32)	8.46	5.74	6.73	4.64	10.92	6.27	4.433***
Arabic word reading (90)	42.71	27.32	41.87	12.24	49.98	9.94	3.006**
Arabic vocabulary (73)	45.18	12.00	31.87	26	50.02	25.97	4.032***
TNL comprehension (12)	5.76	3.01	5.14	3.09	6.57	2.74	2.497*
TNL production (24)	9.23	4.79	8.01	4.28	10.76	5.01	3.044**
Reading comprehension (42)	20.43	9.90	15.47	8.98	23.02	9.44	3.154**

*$p < .05$, **$p < .01$, ***$p < .001$.

Table 6. *Correlations among Arabic variables*

Variable	1	2	3	4	5
1. Nonverbal reasoning					
2. Arabic word reading	.343**				
3. Arabic vocabulary	.494**	.520**			
4. TNL comprehension	.441**	.303*	.661**		
5. TNL production	.458**	.170	.530**	.595**	
6. Arabic Reading comprehension	.404**	.777**	.642**	.465**	.373**

**$p < .01$

Table 7. *Hierarchal linear regressions predicting Arabic reading comprehension*

Step and predictor	ΔR^2	Model with TNL comprehension	Model with TNL production
1. Age	.359***	.129	.123
Nonverbal reasoning		.008	-.009
2. Arabic word reading	.297***	.572***	.588***
3. Arabic vocabulary	.040**	.214†	.214†
4. TNL comprehension	.004	.087	
4. TNL production	.008		.115

†p < .10, *p < .05 **p < .01, ***p < .001.