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Title: The role of socioemotional wellbeing difficulties and adversity in the L2 acquisition of first-generation refugee children*

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Abstract

First-generation refugee children often experience pre- and post-migration adversity and display high levels of mental health/wellbeing difficulties, but to date, research has not examined the impact of such factors on refugee children's L2 acquisition. Accordingly, this study examined the influence of externalizing and internalizing problem behaviours (wellbeing), time in refugee camps and low socioeconomic status (SES) (adversity) on the English-L2 abilities of 117 Syrian refugee children (7-14 years) in their third year of residency in Canada. Wellbeing difficulties and adversity factors accounted for variance on L2 vocabulary, morphosyntax, listening comprehension and narrative production tasks, beyond the variance accounted for by age of L2 acquisition and length of L2 exposure. Specifically, externalizing problem behaviours, time in refugee camp, maternal education and maternal employment predicted variance in L2 abilities. It is concluded that refugee children could have influences on their L2 acquisition that are different from those of bilinguals with other backgrounds.

The role of socioemotional wellbeing difficulties and adversity in the L2 acquisition

of first-generation refugee children

According to the United Nations Refugee Agency (UNHCR), there were about 26 million refugees worldwide from 2018 to 2020, with half being children and youth and with Syria being the largest source country (UNHCR, 2021; UNHCR, 2019). The war in Ukraine, beginning in February 2022, had already resulted in over 4.5 million new refugees by April 2022, most of whom were women and children (UNHCR, 2022); these events in Ukraine are a reminder of how suddenly and quickly refugee migrations can occur. Refugee children often face many adversity factors prior to resettlement, such as interrupted education, frequent transitions, exposure to violence, separation from family, extended stays in refugee camps, and poverty/deprivation (Fazel & Stein, 2002; Hadfield, Ostrowski, & Ungar, 2017; Sirin & Rogers-Sirin, 2015). Mental health and wellbeing difficulties often persist after resettlement, and refugee children display higher levels of socioemotional wellbeing difficulties, anxiety, depression and post-traumatic stress disorder than children born in the host country (Bronstein & Montgomery, 2011; Fazel & Stein, 2002; Hadfield et al., 2017). Post-migration, the absence of grade appropriate education levels for their age, and the struggles of acculturation to a new society and education system, can also impact refugee children's mental health and wellbeing, and in turn, their success in school and social inclusion (Browder, 2018; Brown, Miller & Mitchell, 2006; Fazel & Stein, 2002; Graham, Minhas & Paxton, 2016; Hadfield et al., 2017; Kaplan, Stolk, Valibhoy, Tucker & Baker, 2016; Potochnick, 2018). Post-migration adversity also includes socioeconomic factors. Recently arrived refugee families often have low socio-economic status (SES) characteristics such as, precarious and crowded housing and low income/unemployment (Hadfield et al., 2017);

such characteristics would be expected to modulate the home language environment as well as family acculturation and social inclusion (De Cat, 2021; Evans, Maxwell & Hart, 1999; Rowe, 2018). Therefore, it is relevant to investigate the influence of wellbeing difficulties and adversity factors on the L2 acquisition of this vulnerable subgroup of bilingual children.

Bilingual children have more heterogeneity and complexities in their language input and experience than children from monolingual backgrounds (Paradis, Genesee & Crago, 2021). A growing body of research has shown that variation in age of acquisition (AOA) and quantitative and qualitative language input factors underlie individual differences in the L2 acquisition of bilingual children from a variety of backgrounds (for review, see Armon-Lotem & Meir, 2019; Paradis et al., 2021). It would be expected that the L2 acquisition of individual children from refugee backgrounds would also be similarly influenced by AOA and input factors. However, it is currently unknown whether factors such as wellbeing difficulties and pre- and post-migration adversity would account for individual variation in L2 acquisition beyond AOA and input factors.

In 2015, the Canadian government launched an unprecedented program to resettle Syrian families who are UNHCR convention refugees and, by 2020, over 76,000 Syrian refugees had arrived in Canada (Immigration, Refugees and Citizenship Canada [IRCC], 2020). This recent migration offers the opportunity to examine the English L2 acquisition of a cohort of refugee children who have fled a civil war with their families at roughly the same time, and have the same L1 and cultural background. Accordingly, the objective of this study was to investigate the influence of wellbeing difficulties and adversity factors on the English L2 acquisition of first-generation Syrian refugee children recently arrived in Canada. Towards this end, we investigated the influence of more well-researched individual difference factors, i.e., AOA and input factors,

alongside the influence of wellbeing and adversity factors, on children's English L2 abilities to ascertain whether the latter made a separate contribution to specifying the variance among individuals. A broad range of tasks were used – receptive vocabulary, morphosyntax/sentence repetition, listening comprehension and narrative skills, in order to comprehensively sample children's L2 abilities.

Socioemotional wellbeing and bilingual development

Socioemotional development is a broad category comprised of various dimensions such as, self-regulation, social competence, social cognition and problem behaviours (Halle et al., 2014). The latter dimension, problem behaviours, is associated closely with socioemotional wellbeing. Mental health and wellbeing difficulties are often linked with cognitive functioning difficulties and, therefore, can be expected to impact learning in general and L2 acquisition more specifically (Graham et al., 2016; Kaplan et al., 2016; Yasik, Saigh, Oberfield & Halamandaris, 2017). The presence of socioemotional wellbeing difficulties in children can be determined through the frequency of problem behaviours displayed by a child; high levels of problematic behaviours could signal concern and referral for clinical diagnosis and intervention (Goodman & Goodman, 2009; Goodman, Ford, Simmons, Gatward, Meltzer, 2000). Problem behaviours can be categorized as *externalizing* and *internalizing* behaviours (Goodman, Lamping & Ploubidis, 2010; Halle et al., 2014). Externalizing behaviours refer to hostile and aggressive physical behaviours, impulsivity and hyperactivity; whereas, internalizing behaviours refer to worry, anxiety, sadness/depression and social withdrawal, and can be somatised as headaches or stomach problems. The present study examines children's socioemotional wellbeing through measuring the frequency of problematic internalizing and externalizing behaviours via parent report.

There is no systematic research focused on the relationship between wellbeing difficulties and bilingual development in refugee children. However, a line of relevant research has examined the associations between various dimensions of socioemotional development and language proficiency in bilingual children (Dawson & Williams, 2008; Han, 2010; McNally Darmody & Quigley, 2019; Sun, Yussof, Mohamed, Rahim, Bull, Cheung, Cheung, 2021; Whiteside, Gooch & Norbury, 2017; Winsler, Kim & Richard, 2014). Large scale studies in the U.K., the U.S. and Singapore have found associations between bilingual children's language proficiency and their socioemotional development, including wellbeing, suggesting a relationship between more problem behaviours and lower language proficiency (Han 2010; Sun et al., 2021; Whiteside et al., 2017; Winsler et al., 2014). More specifically, Dawson and Williams (2008) found that Hispanic children in the U.S. who were not English-proficient by the end of Grade 1 had higher rates of externalizing behaviours than their English-proficient peers by the end of Grade 3. McNally et al. (2019) found that bilingual 5-year-olds had a lower incidence of problems behaviours if they had larger expressive vocabularies in the L2.

While this research points to a connection between socioemotional development and wellbeing on the one hand and language learning on the other, it has limitations with respect to the focus of the present study. First, no existing studies have included bilingual children who are both first-generation and from refugee backgrounds. Because this is a vulnerable group of bilinguals who often have developmental risk factors, it is important to examine this group separately from other bilinguals. Second, most studies on socioemotional development and wellbeing have used either global language proficiency or vocabulary measures, and thus, it is unknown if the relationship between wellbeing and language skills holds across other, different measures of language abilities. Finally, existing research focuses almost exclusively on the

preschool and early elementary school years, leaving a gap in knowledge regarding associations between wellbeing and L2 development in older, first-generation children and youth.

Family socioeconomic status (SES) and bilingual development

SES is an index of overall social cultural capital in a family and, in particular, it is a distal home language environment factor (De Cat, 2021; Prevoo, Malda, Mesman, Emmen, Yeniad, van Ijzendoorn & Linting, 2014; Rowe & Snow, 2020; Rowe, 2018). Maternal education is frequently used as a proxy for SES, although SES is more properly viewed as a complex composite of many family characteristics that can influence children's development (De Cat, 2021; Rowe, 2018). Potential influences on home language environment from low SES families include not only maternal education but also parent occupation, family income and deprivation factors such as, precarious and crowded housing, unemployment, food insecurity and other material hardships, as well as increased stress and mental health issues due to the deprivation factors which reduce interactions with children (De Cat, 2021; Evans et al., 1999; Halle et al., 2014; Rowe, 2018). Therefore, low income, deprivation and stress factors could reasonably be expected to influence the quantity and quality of language input and interaction between parents and children at home beyond maternal education, even though maternal education makes an important contribution to the SES construct (De Cat, 2021).

Research with monolingual preschoolers has shown a robust relationship between SES and proximal input factors such as quantity and quality of input at home, and in turn, children's rate of language development (Rowe & Snow, 2020; Rowe, 2018). By contrast, the effects of family socioeconomic status (SES) and maternal education on language development are modulated by additional factors in a bilingual context. For example, SES can differentially impact the heritage-L1 and the majority-L2 (Place & Hoff, 2016; Rojas et al., 2016; Winsler et al., 2014).

Furthermore, maternal fluency in the L2 and language of maternal education can mediate the impact of maternal education on L2/majority language abilities (Place & Hoff, 2016; Prevoo et al., 2014; Sorenson Duncan & Paradis, 2020a). Regarding sequential bilinguals in particular, the relationship between SES, proximal input factors and L2 development is less straightforward because parents might not be fluent speakers of the L2 and might use the L1 and not the L2 at home; this could alter the interactive, linguistic and cognitive advantages associated with higher SES backgrounds and children's home language environment found for monolinguals (Rowe & Snow, 2020). Finally, school-age sequential bilingual children who are beginner L2 learners are beyond the early learning years when the relationship between SES and language abilities has been studied intensely (*cf.* Rowe & Snow, 2020). In spite of these additional complicating factors, several studies have found that lower SES background is associated with weaker L2 vocabulary and morphosyntax in school-age simultaneous and sequential bilingual children (De Cat, 2021; Gathercole, Kennedy & Thomas, 2016; Golberg, Paradis & Crago, 2008; Meir & Armon-Lotem, 2017; Oller & Eilers, 2002). To date, research has not focused on multiple SES components as indices of adversity in the context of the L2 development of recently arrived refugee children.

The role of AOA in child L2 development

When considering AOA within the childhood years, several studies have found that older AOA is associated with faster L2 development for school-age sequential bilingual children, when the amount of L2 exposure has been controlled for (Chondrogianni and Marinis 2011; Golberg et al. 2008; Jia & Fuse, 2007; Paradis, 2011; Paradis & Jia, 2017). This older-AOA advantage has been found for vocabulary, morphology and syntax. The greater cognitive maturity and advanced L1 development of older children could underlie their faster rate of L2

development (*cf.* Paradis, 2011). The positive boost to the L2 given by interdependence between both languages in child bilinguals could also be a factor in the advantage of older age of acquisition (*cf.* Cummins, 1991). This is because a more developed L1 and more advanced cognition would lay a strong foundation for L2 learning. However, even if children with an older AOA acquire the L2 faster early on, their younger AOA peers could surpass them in L2 attainment in the longer term (*cf.* DeKeyser, 2012; Jia & Fuse, 2007).

The role of AOA could have special significance for first-generation refugee children who have fled recent social disruptions and war, like those from Syria. Older arrivals may have experienced interrupted schooling. Interrupted schooling refers to a child not having school experience commensurate with their age because of school closures due to war or families being in transition. Interrupted schooling is a noted developmental risk factor in refugee children (Fazel & Stein, 2002; Hadfield, et al., 2017; Sirin & Rogers-Sirin, 2015) and, more specifically, could weaken the cognitive and linguistic foundations for learning an L2.

The limited existing research on AOA and refugee children has shown mixed results. Three studies have examined the bilingual development of Arabic L1 – German L2 and Arabic L1 - English L2 refugee children in Germany (Hamann, Chilla, Ibrahim & Fekete, 2020) and Canada (Paradis, Soto-Corominas, Chen & Gottardo, 2020; Soto-Corominas, Daskalaki, Paradis, Winters-Difani & Al Janaideh, 2021). In Hamann et al. (2020) and Paradis et al. (2020), moderate and positive correlations between AOA and L2 outcomes were present in the samples for each study; however, AOA did not emerge as a significant predictor in regression models of German L2 syntax, and English L2 vocabulary and morphology, respectively, in spite of there being a wide range of AOAs in the samples. In contrast, Soto-Corminas et al. (2021) did find older AOA to be a significant predictor of stronger syntactic abilities in English L2 syntax.

Paradis et al. (2020) and Soto-Corominas et al. (2021) are of particular relevance because these studies were based on data from the first wave of data collection from an overlapping sample of the Syrian refugee children who participated in this study; the present study is based on the second wave of data collection (one year later). The hypothesized importance of AOA in refugee populations and the mixed findings from the first wave prompted us to include AOA in this study. Second wave data were chosen for the present study because more detailed information for SES components were collected at this wave.

The role of input factors in child L2 development

Length of exposure to the L2 (i.e., input quantity) is a robust predictor of individual differences in L2 vocabulary, morphosyntax and narrative skills in school-age bilinguals (Bohman, Bedore, Peña, Mendez-Perez & Gillam, 2010; Chondrogianni & Marinis, 2011; Govindarajan & Paradis, 2019; Paradis, 2011; Paradis et al., 2017; Paradis & Jia, 2017; Rojas et al., 2016). More qualitative characteristics of L2 exposure also predict individual differences in L2 development. For example, engagement in language rich media and social activities in the L2 predicts stronger L2 abilities beyond the influence of overall length of L2 exposure (Jia & Fuse, 2007; Kaltsa, Prenza & Tsimpli, 2019; Paradis, 2011; Paradis & Jia, 2017; Paradis et al., 2017; Prevoo et al., 2014; Tuller, Hamann, Chilla, Ferré, Morin, Prévost, dos Santos, Abed Ibrahim, Zebib, 2018). By contrast, studies investigating the positive influence of concurrent L2 use in the home have found some mixed results, possibly due to the lack of L2 fluency among parents in some studies (Chondrogianni & Marinis, 2011; Kaltsa et al., 2019; Oller & Eilers, 2002; Paradis, 2011; Sorenson Duncan & Paradis, 2020b).

Existing studies with Arabic L1 – English/German L2 refugee children show findings broadly in line with what is described above for length of L2 exposure, richness of the L2

environment and L2 use at home (Hamann et al., 2020; Paradis et al., 2020; Soto-Corominas et al., 2021). Because length of L2 exposure is the most robust and well researched predictor across studies with different bilingual populations and linguistic subdomains, this constituted the input factor in the present study. Sample size precluded the inclusion of other input factors in the regression models.

The present study

We examined the English L2 abilities of Arabic L1 children ($N = 117$) from Syrian refugee families resettled in Canada as part of a special government program initiated in 2015. L2 abilities were examined across different linguistic tasks: receptive vocabulary, morphosyntax in production (sentence repetition), listening comprehension, and narrative story telling (macro and microstructure). We selected a diverse set of receptive and expressive language tasks in order to comprehensively assess how the individual difference factors predicted variance in children's L2 abilities.

Regarding individual difference factors, we included AOA and length of L2 exposure - factors known to predict variation in L2 acquisition in all child bilinguals - as well as more refugee-oriented factors which index wellbeing difficulties (the frequency of problematic internalizing and externalizing behaviours) and adversity. Adversity factors included time spent in a refugee camp and SES components (maternal education, maternal employment and family size). Information on interrupted schooling in Arabic pre-migration and on current family income were also collected as part of the adversity construct, but as explained in the first section of the *Results*, neither of these variables could be entered into the regression models. The research questions addressed in this study are as follows:

1. What is the extent of the wellbeing difficulties and adversity factors in this participant sample of refugee children?

2. Are wellbeing difficulties and adversity factors associated with English L2 abilities when length of L2 exposure and AOA are accounted for?

Method

Participants

The data included in this study comprises the second wave of data collection in an ongoing longitudinal study. There were 117 participants (58 females) children, all of them Syrian refugee children who, at the time of testing, had resided in Canada for an average of three years and were 10 years old on average. These participants came from 63 families, with between 1 and 4 participants belonging to the same family (i.e., as siblings). This nested structure of the data set is accounted for in the modeling analyses. More details on participant and family characteristics are provided in the *Results* section.

The participants were residing in one of three English-majority Canadian cities at time of testing, Edmonton, Waterloo and Toronto, and all were attending English-medium elementary and middle schools (grades 1-8), with the majority in the mid-elementary school grades. The majority of children were mainstreamed in classrooms with other English language learners and monolinguals, and received English-as-a-second-language support through within-classroom programming and/or a pullout system. According to parent report, children had minimal to no exposure to English prior to migration, and a minority (18.8%) possibly had some exposure to Turkish while the family was in transition in Turkey, but how substantial this exposure was is unknown.

Procedures

Child participants were tested either in their schools or at home. Parent questionnaires were administered orally as interviews by a native speaker of Syrian Arabic or a closely related variety of Levantine Arabic. Interviews were conducted in homes or at the school. Since children were tested in both English and Arabic as part of the broader research project, language order was randomized for participants. Task order was similarly randomized. Information on the parent questionnaires and English L2 measures are provided in this section.

Alberta Language Environment Questionnaire-4 (ALEQ-4; Paradis et al., 2020). This questionnaire was designed to gather information on participants, their families, and their language environments. From this questionnaire we obtained the AOA and length of L2 exposure variables for the study, as well as the adversity factors, such as length of time in refugee camps (months), amount of schooling in Arabic pre-migration, and SES components which included maternal education (in years), family size (number of children in the family), parental employment and family income. We also collected information on the relative use of English and Arabic in the home by asking parents to indicate their language use with a 1-5 scale (1=Mainly or only Arabic, 2=Usually Arabic/English sometimes, 3=Arabic and English, 4=Usually English/Arabic sometimes, 5=Mainly or only English). We initially obtained this information for each member of the household in terms of output given to and received from the child and we subsequently calculated composite scores of relative Arabic/English use across parents, on the one hand, and siblings, on the other, with numbers closer to 1 indicating more Arabic use. Details are in Table 1.

Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997). This is a screening questionnaire comprised of 25 questions that is frequently used as an index of child wellbeing by

assessing problem and prosocial behaviours in children aged 3-16. In this study, we report the data of the parent version of the SDQ, where parents completed the SDQ for each participant.

The SDQ produces five scales, four of which describe problem behaviours: hyperactivity, conduct, emotional, and peer relationship problems. Each scale ranges between 0-10, with higher numbers indicating higher prevalence of problem behaviours. SDQ results can be considered independently by scale, combined into two amalgamated scores (externalizing and internalizing), or combined into one total difficulties score. For this study we considered the externalizing and internalizing amalgamated scores, which have been shown to have good discriminant ability (Goodman et al., 2010). The Cronbach's alpha for the SDQ was .70.

Peabody Picture Vocabulary Task – 4th Edition (PPVT; Dunn & Dunn, 2007). We used the PPVT as a measure of vocabulary skills. In this test, children are presented with an array of four pictures and are asked to point to the picture that corresponds to the word given by the examiner. This test produces both a raw score (out of 228) and a standardized score. Since the participants included in this study arrived as part of a cohort, we used the raw score in the analyses because age-corrected standard scores would be biased for older arrivals. The Cronbach's alpha for this test was .97.

Sentence Repetition Task (SRT; Soto-Corominas et al., 2021). We developed a SRT, adapted from COST-LIMUS assessment measures (Marinis & Armon-Lotem, 2015) for the longitudinal research project in both Syrian Arabic and English. While SRTs measure primarily morphosyntactic abilities, it is important to note that they also implicate lexical and verbal memory skills (Polišenská, Chiat & Roy, 2015). The English SRT included 32 items (1 practice item and 31 scored items) with the following morphosyntactic structures: declaratives, short and long passives, *wh*-object questions, coordinated clauses, subordinate clauses and relative clauses.

Participants were presented with the 32 items, one at a time, on noise-cancelling headphones

using a PowerPoint. While they were allowed to listen to the practice item as many times as

needed until they could produce a verbatim repetition, they were only allowed to listen to the

scored items once. Participants' productions were recorded and were subsequently scored.

Verbatim response scoring was implemented for this study; that is, whether a given sentence had

been repeated identically (1) or not (0). This type of scoring is highly correlated with other, more

fine-grained types of scoring (Soto-Corominas et al., 2021). A detailed description of this task in

both languages appears in Soto-Corominas et al. (2021). The stimuli for the English SRT are

presented in Appendix S1. The Cronbach's alpha of the verbatim scoring of the SRT was .93.

Test of Narrative Language (TNL; Gillam & Pearson, 2004). Participants completed the

Comprehension and Production subtests of the TNL. We used the comprehension subtest as a

global measure of listening comprehension skills; thus, this is a task demanding the integration

of many linguistic and cognitive skills. In this subtest, participants were asked to listen to a given

story, the Treasure story, that was presented to them in noise-cancelling headphones. The plot of

this story revolves around two children who discover a dragon guarding a treasure chest and

struggle to be believed by their parents when they tell them about their experience. After

listening to the story, participants answered 12 comprehension questions, for a total of 13 points.

Questions targeted both literal and inferential information. Since this test was administered

following standard procedures, questions could not be rephrased or repeated for participants.

We used the Production subtest as a measure of narrative production skills. In this

subtest, participants were provided with a picture, corresponding to the Aliens story, where a

family of aliens is seen landing in a local park. After viewing the picture, participants were asked

to generate a story to go with the picture. Participants' narratives were recorded and were

subsequently scored for story content (i.e., macrostructure) and story complexity (i.e., syntactic

complexity, grammaticality, and story structure, i.e., microstructure) following TNL scoring

criteria. Thus, like listening comprehension, scores for narrative production index the integration

of many linguistic and cognitive skills. This test has 24 items for a total of 30 possible points for

a combined score of content and complexity.

The Cronbach's alpha for the comprehension subtest was .73 and for the production

subtest, it was .81.

Data Analysis

All descriptive and inferential statistics were performed in R (version 4.0.3; R Core Team,

2020). To determine the association between linguistic abilities and child factors we ran four

mixed-effects logistic regressions using the package lme4 (version 1.1-26; Bates et al., 2015),

one for each linguistic task (i.e., vocabulary, morphosyntax, listening comprehension, and

narrative production). All models estimated the probability of a correct response to each item of

the task, and so no aggregate scores were modeled.

The fixed effect structure included the following eight predictors: AOA (calculated as the age

at the onset of schooling in Canada), length of L2 exposure (calculated as the months elapsed

between AOA and testing), SDQ externalizing scores, SDQ internalizing scores, time spent in a

refugee camp, maternal education, number of children in the family, and maternal employment

(whether employed or not). To facilitate interpretation of the coefficients, all numerical

predictors were centered and standardized using the function *scale* from the base package in R.

AOA and length of L2 exposure comprised our main control variables. It should be noted

that we could not enter AOA and age at testing in the model together, as these variables were

correlated at .96 in this sample (as would be expected in groups who migrated as a cohort). Cumulative exposure to the L2 was chosen over a concurrent input factor such as language use at home because the former predicts more individual variance consistently across studies (see *The role of input factors in child L2 development*). SDQ externalizing scores, SDQ internalizing scores, and time spent in a refugee camp comprised the wellbeing/adversity factors. Finally, maternal education, number of children in the family, and maternal employment were the SES components in the model (see *Participant and family characteristics* for justification of the use of these SES components).

For each model, the random effect structure started as maximal: we included a random intercept for participant nested within family, and one random intercept for item. We included a random by-item slope for each predictor in the model. However, this led to singularity issues, which were resolved by uncorrelating the slopes and removing those slopes that had null variance (i.e., that did not contribute to the model). As a result, each model had a different set of random slopes. These are specified in Appendix S2.

Model diagnostics were performed on all models with the *car* (3.0-10; Fox & Weisberg, 2019) and *DHARMa* (version 0.3.3.0; Hartig, 2020) packages. Models were inspected for multicollinearity, overdispersion (when applicable), excessive influence/leverage of individual observations, heteroscedasticity, and violations of the normality of the deviance residuals.

Results

Participant and family characteristics

In order to address our first research question regarding the extent of wellbeing difficulties and adversity factors in our sample, participant and family characteristics are presented here in some detail.

First, information on age at testing, AOA and input factors are presented in Table 1. On average, children were 7 ½ years old (M = 91.38 months, SD = 24.08 months) when they began learning English at school, and they had been exposed to English for nearly three years on average (M = 32.30 months, SD = 6.93) at time of testing. As shown by the low scale numbers for *Language use with parents* and *with siblings*, Arabic remained the dominant household language after three years of residency in Canada. It is noteworthy that this participant sample showed a wider variation in AOA than in length of L2 exposure; this is expected because they were resettled as a cohort in Canada in 2016 and 2017. Also, because of the sample being part of a cohort, there was no significant correlation between length of L2 exposure and AOA (see Figure 3).

<Insert Table 1 about here>

Regarding wellbeing difficulties, scores for externalizing (*M* = 5.22, *SD* = 2.79) and internalizing (*M* = 3.15, *SD* = 2.39) behaviours showed low incidence on average (scores can range from 0-20); nevertheless, there was a wide variation in our sample. Figure 1 shows participants' scores for the four SDQ individual subscales used to calculate the amalgamated scales of externalizing and internalizing behaviors, together with the original three-band categorization of scores, which separates normal, borderline, and abnormal scores. This three-banding classification was originally based on a population-based survey in the United Kingdom

so that 80% of children in the community would be classified as normal, 10% as borderline, and 10% as abnormal. It should be noted the bands had not been adjusted for age, gender, or race (see Goodman, 1997). As shown in Figure 1, a number of participants in this sample scored in the borderline and abnormal ranges of the four scales (for hyperactivity = 24.79%, conduct = 14.53%, emotional = 11.97%, peer problems = 18.80% of our participant sample), as shown by scores at or above the dashed line.

<Insert Figure 1 about here>

Turning to pre-migration adversity factors, a total of 18 families, 28.57% of our sample, spent some time in a refugee camp; of this group, the mean length of time spent was 24 months (SD = 19.37 months). However, all families spent time in transition before resettlement in Canada. That is, no families left their city/town of residence in Syria to travel directly to Canada. Most were forced to spend time outside of Syria in one or multiple countries. The most common countries of relocation were Jordan, Lebanon, Turkey, and Egypt. A total of 18 participants had interrupted schooling, as defined by missing years of school prior to re-settlement when the child was old enough to be in school in Syria (mandatory schooling is at age 7; total number of children who met the age criterion in our sample was 67). As mentioned earlier, even though several children in our sample experienced interrupted schooling – a noted adversity factor, we did not enter this factor in the modeling analyses because of its strong confound with AOA in our sample. Participants who were classified as having interrupted schooling were older at arrival (M = 116.6 months; SD = 16.36) than those who were not classified as such (M = 84.53 months;

SD = 22.73). This difference was statistically significant: $t(30.387) = 7.147$, $p < .001$ (Cohen's *d* = 1.62, large effect size).

We now turn to information regarding SES (see Table S1). All families were living in precarious rental housing at time of testing. The majority of mothers and fathers had primary level schooling only, followed by those with secondary level schooling, and then, a much smaller proportion with post-secondary education. Mothers had a mean of 9.48 years of education (*SD* = 3.89) and fathers had 9.70 years (*SD* = 3.78). While all families were living on social assistance after initial re-settlement to Canada, after 3 years of residency, a minority had begun to enter the workforce. A total of 40% of fathers and 11% of mothers declared having some employment outside the home; all were part-time or temporary and non-professional. Families were large, with the vast majority having 3-6 children. This is well above the average for Canada, where women have an average of 1.47 births in their lifetime (Statistics Canada, 2020). Parent-child interaction and parent facilitation of a language rich home environment (for both languages) would have been stretched thin with more children in precarious, crowded housing (Evans et al., 1999; Rowe, 2018). A total of 32 out of the 63 participating families declined to disclose their family income. Of the remaining 31, the vast majority (*N* = 25) declared having incomes under $40,000/year. As a frame for comparison, the median after-tax income for couples with children in Canada was $105,500 in 2019, with $40,000 marking the poverty line (Statistics Canada, 2021a, 2021b). Therefore, all 31 families who disclosed their income had low incomes and at least 25 of them lived below the poverty line.

In sum, participating families had multiple characteristics of low SES. For the modelling analyses, maternal education in years, maternal employment (yes-no) and number of children in the family were entered as SES components. This decision was made because these were the

factors where there was sufficient variability in our sample for them to be effective predictors in a regression model. Because only less than half of families declared their income, this variable could not be used. We used the information for maternal education and employment instead of the respective paternal information as 6 of the participants did not have a father in the home. In addition, we did not have the employment information for the father of two additional participants. As such, using paternal education and employment as predictors would have reduced our sample size.

Modelling L2 abilities as a function of individual difference factors

The L2 tasks whose scores served as outcome variables for the models were receptive vocabulary (PPVT), morphosyntax (SRT), listening comprehension (TNL) and narrative production (TNL). The fixed effect variables entered were as follows: AOA, length of L2 exposure, frequency of problematic internalizing and externalizing behaviours, time spent in a refugee camp and SES components (maternal education, maternal employment and number of children in the family). The distribution of raw scores on the L2 tasks are presented in Figure 2. The y-axis for each test covers the range of possible scores on the test, to contextualize participants' performance. Correlations between the individual difference factors that were entered in the models were conducted to check for collinearity (see Figure 3). There was only one significant and moderate correlation, namely between Maternal education and Number of children in the family ($r = -.31$, $p = .001$).

<Insert Figure 2 about here>

<Insert Figure 3 about here>

Receptive Vocabulary (PPVT). As described in the *Data analysis* section, we modeled the probability of a correct response to each item of the PPVT using mixed-effects binomial regression. The results of this model appear in Table 2. Length of L2 exposure, externalizing problem behaviours, and maternal education, were all significantly and positively associated with L2 vocabulary. In addition, maternal employment was also a significant predictor: children with employed mothers were more likely to give a correct response than children with unemployed mothers. Information on the random effects for this model appears in Appendix S2.

<Insert Table 2 about here>

Morphosyntactic production (SRT). The results for this model appear in Table 3. Information on the random effects appears in Appendix S2. AOA, length of L2 exposure, and maternal education were significant and positive predictors of L2 morphosyntax; whereas time spent in a refugee camp trended toward significance. The association between performance on the morphosyntax task and time spent in a refugee camp was negative.

<Insert Table 3 about here>

Listening comprehension (TNL). The test used to assess listening comprehension skills (i.e., TNL-Comprehension) has items yield more than 1 point. For example, Item 1 in this test gives the participant 2 points if they can recall the names of the two characters in the story, 1 point if

they can only recall one, and 0 points if they can recall neither. As such, the outcome variable of this test was a proportion of correct/incorrect for each item, and it was similarly modeled with a generalized linear mixed-effects model with a Binomial distribution.

The results for this model appear in Table 4. Information on the random effects appears in Appendix S2. AOA, length of L2 exposure, and maternal education were significantly and positively associated with performance on the listening comprehension task, whereas externalizing behaviours had a significant but negative association with the outcome. Finally, maternal employment was a significant predictor, whereby children with more educated mothers were more likely to give a correct response.

<Insert Table 4 about here>

Narrative Production (TNL). The model for narrative skills had the same structure as the one for listening comprehension and the model results appear in Table 5. Information on the random effects appears in Appendix S2. In this model, AOA and length of L2 exposure were significant and positive predictors. Externalizing behaviours trended towards significance. The association between externalizing behaviours and narratives was negative.

<Insert Table 5 about here>

Discussion

The objective of this study was to investigate whether wellbeing difficulties and adversity factors were associated with the L2 acquisition of recently arrived refugee children from Syria.

In order to meet this objective, children's L2 abilities were modelled to determine whether externalizing and internalizing problem behaviours, time in refugee camps, maternal education, maternal employment, and family size predicted individual variance in L2 abilities beyond the variance explained by AOA and length of L2 exposure. L2 abilities were assessed comprehensively by including 4 different language tasks: receptive vocabulary (PPVT), morphosyntax (SRT), listening comprehension (TNL) and narrative production (TNL).

Our first research question asked what the extent of wellbeing difficulties and adversity were in our sample. While frequency of problematic externalizing and internalizing behaviours was not high on average, there was a range of frequencies, with 12-25% of our sample exhibiting behaviours in the borderline to abnormal range (Figure 1). All participating children had experienced transitions from Syria to at least one other country before resettlement in Canada, and 29% of families had spent time in refugee camps. For participants who were school age upon arrival, defined as being age 7 or older, about 27% had interrupted schooling (i.e., 18 participants out of the 67 who were school age). Finally, participants' families were uniformly low SES, as determined by average maternal education, average number of children, housing, income, and parent employment; however, there was some variation among families with respect to maternal education levels, number of children in the family and parent employment; these variables were thus entered in the regression models. In sum, socioemotional wellbeing difficulties were present for some children in the sample, and several pre- and post-migration adversity characteristics noted in prior studies were present in our sample (*e.g.,* Graham et al., 2016; Hadfield et al., 2017).

After about 3 years of exposure to English, children displayed wide variation in their performance on the 4 language tasks (Figure 2). Multilevel modelling was undertaken to

determine which factors accounted for this variation in performance. Our second research question asked whether wellbeing and adversity factors would predict individual differences in children's L2 abilities beyond the variance accounted for by AOA and length of L2 exposure. For vocabulary, morphosyntax and listening comprehension, certain wellbeing and adversity factors contributed significantly to the improvement of model fit beyond AOA and length of L2 exposure; for narrative production, trends emerged for these factors. Therefore, our overall results render an affirmative answer to our second research question, but there were inconsistencies in predictor strength across tasks, with the exception of length of L2 exposure. We now turn to a discussion of the contributions of different predictors to L2 outcomes.

Our sample of participants had a mean AOA of 7 ½ years, with a range from 4 -11 ½. Our results showed that older AOA was significantly predictive of better L2 performance on the morphosyntax, listening comprehension, and narrative production tasks; thus, findings for these refugee children are consistent with studies cited earlier based on child bilinguals from other backgrounds. The absence of a relationship between AOA and vocabulary in this study could be due to the minimal cognitive demands of the vocabulary task compared to the other tasks. In *The role of AOA in child L2 development*, we mentioned that the potential advantage of an older AOA could be greater cognitive and linguistic maturity at the onset of L2 learning, affording more potential for interdependence in their bilingual development. However, for the refugee children in our sample, interrupted schooling might have weakened their L1 foundation for L2 learning. Because of the confound in our sample between length of Arabic schooling and AOA, we could not examine the effect of interrupted schooling directly. Nevertheless, our results appear to indicate that, even though 27% of children who arrived at age 7 or older experienced interrupted schooling, this did not eliminate the older AOA advantage in rate of L2 acquisition

(when measured after 3 years of residency). In addition, for many children in our sample, their AOAs coincided with the mid to late elementary school years. This suggests that the children would have been exposed to advanced language and literacy input in the L2, and perhaps had a lot of motivation to acquire the L2 quickly in order to keep up academically and fit in socially. This could have added to the older AOA advantage. Future research is needed to determine more about the nature of the older AOA advantage in the early stages of child L2 acquisition.

The modelling analyses indicated that the presence of externalizing behaviours was a consistently negative predictor of L2 abilities in vocabulary and listening comprehension; for narratives it emerged as a trend. Even though internalizing problem behaviours are equally indicative of wellbeing difficulties, these did not emerge as a significant predictor in any model. Note that this lack of significance is not due to the analytical approach. To ensure that was the case, we ran the models with internalizing behaviours only and this predictor was never significant. This is unsurprising since externalizing and internalizing behaviours were not significantly correlated (see Figure 2). This difference between externalizing and internalizing behaviours could be due to our use of the parent report on youth, and not the youth self-report version of the SDQ. There is evidence that parent reports are more reliable than youth self-reports in identifying difficulties in conduct and hyperactivity (i.e., externalizing difficulties), while youth self-reports may be more reliable in identifying emotional difficulties such as depression and anxiety (i.e., internalizing difficulties) (Aebi et al., 2017; Edelbrock et al., 1986; Loeber et al., 1990). We were not able to use the youth self-report version for this study because not all the children were old enough to complete it. Notwithstanding the lack of association for internalizing behaviours, the association between more externalizing problem behaviours and lower L2 abilities indicates that wellbeing difficulties and L2 acquisition are interrelated in

bilingual development. Additional studies are needed to understand the directionality of the relation, however. It might be the case that hyperactivity and aggressive behaviours diminish social opportunities that support L2 learning. Conversely, lower L2 abilities could create communication barriers that might reinforce problem behaviours. Our results fall in line with studies discussed in *Socioemotional wellbeing and bilingual development* and extend them to older children, different linguistic skills and first-generation refugees.

Adversity factors that could be entered into models included time in refugee camp and the SES components: maternal education, maternal employment, and family size. There was a trend towards significance for longer periods of time in refugee camps to be negatively associated with morphosyntactic abilities, and we do not have an explanation for why this effect only emerged for this task. It is possible that time in refugee camps would exert more influence just after arrival in the host country, at the onset of L2 learning, and this might reduce the ability to detect a difference after 3 years of residency. Further research would be needed to know if this explanation holds.

In contrast to time in refugee camps, higher level of maternal education was a significant and strong predictor of vocabulary, morphosyntax, and listening comprehension. It is relevant to point out that mothers spoke almost exclusively in Arabic with their children (Table 1), so the positive influence on L2 development cannot be attributed to proximal L2 input and interaction. Instead, the influence could be attributed to the more distal effects of higher education on parenting and family social cultural capital (De Cat, 2021; Rowe, 2018) or perhaps indirectly to the L2 via influence on the L1 through interdependence (Blom, Soto-Corominas, Attar, Daskalaki & Paradis, 2021; Soto-Corominas et al., 2021). Because participating families were generally low SES in terms of other components, the strong impact of maternal education could

suggest that higher maternal education is a mitigating factor against the adversity of low SES background post-migration. Similar to maternal education, maternal employment (which was a dichotomous factor describing whether mothers were employed or unemployed) emerged as a significant and positive predictor of performance on the vocabulary and listening comprehension tasks. Thus, having an employed mother was associated with stronger L2 abilities. In our sample, maternal fluency in the L2 and maternal education levels were not significantly different for employed versus unemployed mothers; however, employed mothers tended to have one less child in the family, i.e., an average of 3 vs. 4 children. In spite of crowded housing and stretched resources being a noted risk factor related to low SES (Rowe, 2018), the number of children in the family was not significantly related to any of our L2 outcome variables. As noted above, employed mothers had on average one child less in the family and, in addition, of all the correlations between the predictors entered in the models, the strongest one was between maternal education and family size. While not posing collinearity issues for the models, the overlap between number of children on the family, on the one hand, and maternal education and employment, on the other, might have reduced the independent contribution of the factor of number of children in the family to predicting L2 outcomes.

Limitations and conclusions

One limitation of the present study is that the role of interrupted schooling could not be fully assessed due to a confound within our sample. A differently structured sample might allow better investigation into relationship of interrupted schooling and L2 learning. While our sample is in line with the Canadian cohort of Syrian refugees in terms of family characteristics (IRCC, 2018), we were not able to gather consistent data on family income, which would have contributed more to the understanding of the role of SES in refugee children's L2 acquisition. Furthermore, our

sample size and nested structure (children with families) constrained the number of fixed effects that could be entered in the models, limiting the exploration of additional factors, for example individual differences in cognitive skills like verbal memory, or correlations between L1 and L2 abilities. Finally, the present study examined concurrent wellbeing and L2 abilities, and the associations found need to be examined in further research with longitudinal designs in order to better understand the directionality of these associations.

The contribution of this study is both theoretical and applied. For individual difference approaches to child L2 acquisition, this study reveals how variables outside of the 'usual suspects', i.e., AOA and proximal input factors, can influence children's development. In particular, finding connections between child wellbeing and specific L2 abilities broadens the scope of the mechanisms that can modulate L2 learning. In the applied domain, our results suggest that educators and clinicians need to be aware of the multiple factors that influence refugee children's development of the majority L2. For example, educators should anticipate that first generation refugee children might need extra support for their L2 learning compared to other child bilinguals. In addition, L2 learners from refugee backgrounds who appear to be struggling (when compared to other L2 peers) might be in need of psycho-social supports as much as speech-language and special education supports. In a nutshell, this study shows that the L2 acquisition of first-generation refugee children is shaped by mechanisms and experiences that might be different from those shaping the L2 acquisition of other bilingual children.

Competing Interests: The authors declare none.

Supplementary materials

Table S1. Family Demographics (file type: MS Word, file size: 15.0KB)

Appendix S1. Stimuli Used in English SRT (file type: MS Word, file size: 14.5KB)

Appendix S2: Tables with Random Effects Information (file type: MS Word, file size: 17.0KB)

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Figure Captions

Figure 1. Participant scores according to SDQ subscale. Each circle and triangle denotes one participant. The white square indicates the mean for that subscale. The error bar indicates one SD below and above the mean. Horizontal, dashed, lines indicate borderline scores, which separate normal (lower) and abnormal (higher) scores. Shape indicates whether each subscale pertains to the externalizing (circle) or internalizing (triangle) amalgamated scales.

Figure 2. Boxplot of participant performance on the four tests, with the y-axis showing the possible range of scores for each test. Medians are indicated by the solid line. Note that the dispersion of the scores is partly a reflection of the scale of the task. For example, the range of vocabulary scores (2A) may appear deceptively small compared with scores from other tasks because the scale ranges from 0-228.

Figure 3. Correlation matrix for Individual difference predictors entered in regression models.

Data Availability: Data that support the findings of this study will be made available through Open Science Foundation https://osf.io approximately 1 year after the end of the longitudinal research program this study is part of, in 2023.