

ORIGINAL ARTICLE

How acculturation and well-being influence the English and Arabic proficiency of first-generation Syrian refugee children in Canada

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Abstract

Research on the associations between refugee children's socioemotional development and bilingual outcomes is limited, although this population has unique migration experiences that could affect such development. This study examined Syrian refugee children's socioemotional development, including well-being difficulties and acculturation, 4.5 years after their resettlement in Canada ($N = 112$; mean age = 11.97). It also investigated how socioemotional development was associated with refugee children's bilingual outcomes in English and Arabic. The findings suggested that, although the children were developing an integration orientation of acculturation, a large proportion of them reported well-being difficulties. Socioemotional development had both direct and mediated associations with bilingual outcomes: children's identification with Syrian culture influenced English outcomes positively, and their enjoyment of Arabic language activities influenced Arabic outcomes positively. Children's enjoyment of Arabic language activities was related to less sibling interaction in English, which, in turn, was negatively associated with English outcomes. Somewhat similarly, identification with Canadian culture was related to less parent interaction in Arabic, which was negatively associated with Arabic outcomes. Well-being difficulties were negatively associated with outcomes in both languages. We conclude that refugee children are faced with unique challenges in their socioemotional development, which in turn influences their bilingual outcomes.

Keywords: Acculturation; bilingual development; language environment; refugee children; well-being

Approximately 44,620 Syrian refugees have arrived in Canada since 2015, with children and youth under 18 comprising half of this group (Government of Canada, 2021; IRCC, 2019). Similar to all children from migrant families, refugee children need to

acquire the societal language (SL) as a second language (L2) in order to adapt to, and thrive in, academic and social contexts in the host country (Cummins, 1981; Nakhaie, 2020; Whiteside *et al.*, 2017). Meanwhile, they also need to maintain and continue developing their heritage language (HL) to connect with their communities and families and maintain heritage culture and identity (Lindner *et al.*, 2020; Oh & Fuligni, 2010). Like all bilingual children, individual variation in their rate of growth in the SL and their maintenance of the HL would be modulated by language environment factors such as relative use of the SL and HL at home, length of exposure to the SL, and richness of language activities in each language (Paradis, 2023).

However, in contrast to children of economic-class immigrant families who were selected for their ability to contribute to Canada's economy, refugee children might have experienced adversity prior to and post resettlement. Many of them witnessed violence, experienced interruptions in schooling, spent time in refugee camps, and lived (or are currently living) in poverty with precarious housing, all of which pose challenges for their socioemotional development (Hadfield *et al.*, 2017; Halle *et al.*, 2014). In addition, refugee children are first-generation migrants, and for older arrivals in particular, they need to adapt to a new language, a new school system and curriculum, and a new culture all at once, and thus, have a more complex acculturation process than second-generation children who were born in the host country (Hadfield *et al.*, 2017; Lindner *et al.*, 2020). Finally, the Syrian refugee children resettled in Canada tend to be from large families where parents have less prior knowledge of English and lower education levels compared to non-Syrian refugee groups and economic-class immigrants who landed around the same time (IRCC, 2018, 2019). Research indicates that parent education is associated with the language environment at home, and in turn, language development in bilinguals (De Cat, 2021; Paradis, 2023). In sum, Syrian refugee children could face unique challenges in their bilingual development related to their socioemotional development, *e.g.*, well-being and acculturation, later arrival in the host country, and possibly limited language environments (Lindner *et al.*, 2020; Oh & Fuligni, 2010; Paradis *et al.*, 2020, 2022).

The objectives of the present study are as follows: (1) to investigate the acculturation orientations and the well-being strengths and difficulties of Syrian refugee children 4.5 years post resettlement, (2) to determine if there are associations between well-being and acculturation and Syrian children's language abilities in Arabic and English, and (3) to investigate whether these associations are direct or mediated through quantitative and qualitative language environment factors such as language use at home and engagement in language-rich activities in both languages.

Socioemotional development and bilingual development

Socioemotional development is a multidimensional concept, including dimensions like self-regulation, social cognition, social competence, and problem behaviors (Halle *et al.*, 2014). Positive outcomes of socioemotional development can be described as positive psychosocial adjustment and good mental well-being

(Dalgaard et al., 2021). Among older immigrant children, acculturation, *i.e.*, adaptation to a new culture and language, constitutes an important part of their social adjustment and identity (Lindner et al., 2020; Oh & Fuligni, 2010). As for mental well-being, it can be indexed by more prosocial behaviors and fewer problem behaviors (Goodman & Goodman, 2009). In the present study, we focus on these two dimensions of refugee children's socioemotional development: one is psychosocial adjustment, specifically, acculturation, and the other is mental well-being, indexed by behavioral strengths and difficulties.

Acculturation and bilingual development

Acculturation can be defined by two independent dimensions (Berry, 2005): the level of maintenance of the heritage culture and identity and the level of reception of the host culture and identity. This bicultural framework specifies four orientations of acculturation: integration (+ host, + heritage, *i.e.*, strong identification with both the host and heritage cultures), assimilation (+ host, – heritage), separation (– host, + heritage), and marginalization (– host, – heritage). The integration orientation is associated with better social adjustment and, therefore, is the most desirable orientation for socioemotional development (Berry, 2005; Sheikh & Anderson, 2018). For Syrian refugee children in Canada, factors such as limited education prior to resettlement, low socioeconomic status prior to and post resettlement, and late age of arrival (IRCC, 2018, 2019) could pose challenges for their acculturation process (Hadfield et al., 2017; Lindner et al., 2020) and thus limit their ability to achieve integrative acculturation.

Acculturation is closely related to migrant children's language development due to the interconnections among language, culture, and cognition (Halle et al., 2014). The relationship between acculturation and bilingual outcomes is likely multidirectional (Paradis, 2023), which means acculturation and bilingual outcomes have effects on each other, and such associations may be mediated by other factors. For example, associations between heritage identity and HL proficiency, and between positive attitudes toward the host culture and SL proficiency, do not show clear evidence for directionality (Armon-Lotem et al., 2014; Bankston & Zhou, 1995; Jia, 2008; Oh & Fuligni, 2010; Phinney et al., 2001). Regarding mediation through other factors, acculturation may influence proximal language environments, such as language interaction and engagement in language-rich activities (Lindner et al., 2020; Zane & Mak, 2003), which subsequently could influence bilingual development. Evidence of acculturation effects on migrant children's language use is scarce, but research with migrant adults indicates that stronger identification with the host culture is intertwined with more use of the SL (Hammer, 2017; Phinney & Flores, 2002).

Finally, acculturation and well-being could influence each other, as they are both aspects of socioemotional development. Acculturation is related to better social cognition and social adjustment (Halle et al., 2014) and more harmonious relationships with others (Oh & Fuligni, 2010). Berry and Hou (2017) found immigrants who had an integration orientation of acculturation reported more life satisfaction and better mental health compared to those who indicated other orientations of acculturation. Therefore, refugee children who have better

acculturation outcomes (*i.e.*, integration orientation) could have fewer well-being difficulties, which in turn might facilitate their language learning, but research on this topic is scarce.

Socioemotional well-being and bilingual development

Socioemotional well-being can be defined as an emotional state that indicates an individual's evaluation of their social interactions (Bericat, 2014). It involves the abilities to effectively develop positive relationships and identify and manage emotions. Syrian refugee children who resettled in Canada often experience adversity, both pre-resettlement (e.g., exposure to violence, loss of family members, experiences in refugee camps; Government of Canada, 2021) and post-resettlement (e.g., language barriers and adaptation to the new school system; Vitoroulis *et al.*, 2023). When experiencing such adversity, children are faced with challenges in their socioemotional well-being, which can be indexed through problem and prosocial behaviors (Goodman & Goodman, 2009; Stone *et al.*, 2010; see Halle *et al.*, 2014 for a review). Specifically, problem behaviors signal potential difficulties with mental health and socioemotional well-being, while prosocial behaviors signal good social adjustment and social relations and, thus, are protective of socioemotional well-being (Goodman & Goodman, 2009). Although parents and teachers often serve as proxies to report on children's well-being difficulties, the most reliable tool to measure well-being is self-report (Northfield *et al.*, 2024).

Research has found relationships between socioemotional well-being and bilingualism (Halle *et al.*, 2014; Paradis *et al.*, 2022; Sun *et al.*, 2018; Whiteside *et al.*, 2017; Winsler *et al.*, 2014). Halle *et al.* (2014) reported that bilingual preschool children have equal socioemotional well-being as their monolingual peers, if not better. Regarding associations between well-being and bilingual development, Sun *et al.* (2018) found a positive relationship between better socioemotional and behavior skills and larger bilingual vocabulary. Longitudinal studies have found bidirectional associations between proficiency in the SL and better socioemotional well-being in early elementary school (Whiteside *et al.*, 2017; Winsler *et al.*, 2014). However, these studies have not examined children from refugee backgrounds specifically, who are at higher risk of mental health difficulties (Hadfield *et al.*, 2017; Kaplan *et al.*, 2016). Indeed, for Syrian refugee children, more problem behaviors are associated with lower performance on English-SL tasks after three years of residency in Canada (Al-Janaideh, 2021; Paradis *et al.*, 2022). Nevertheless, it remains unknown how long these associations persist post resettlement or whether they also impact the Arabic-HL. Furthermore, research on both younger bilingual children (e.g., Sun *et al.*, 2018; Whiteside *et al.*, 2017; Winsler *et al.*, 2014) and refugee children (e.g., Al-Janaideh, 2021; Paradis *et al.*, 2022) suggested that the association between well-being difficulties and bilingual development might involve complex mechanisms: it is possible that well-being difficulties interfere with cognitive functioning, which lowers language learning capacities (Graham *et al.*, 2016). It is also possible that such difficulties interfere with social interaction and engagement in language-rich activities, which in turn, limit language learning opportunities (Paradis, 2023; Winsler *et al.*, 2014).

Language environment factors and bilingual development

In addition to socioemotional development factors reviewed above, language environment factors are known to impact bilingual development. Interaction in the SL and HL among family members at home comprises an important part of migrant children's language environment. Interaction with particular interlocutors (*e.g.*, parents versus siblings) can have unique effects on children's bilingual outcomes. First, while the SL use by non-proficient parents is not highly supportive of SL development in bilingual children (Chondrogianni & Marinis, 2011; Hammer et al., 2012; Place & Hoff, 2016), the SL use among siblings is supportive (Paradis et al., 2021; Sorenson Duncan & Paradis, 2020; Tsinivits & Unsworth, 2021). Second, home interaction in the HL among all family members has a robust positive relationship with HL outcomes, and interactions with fathers versus mothers could have differential effects (Daskalaki et al., 2020; Flores et al., 2017; Hammer et al., 2012; Jia & Paradis, 2020; Place & Hoff, 2016). Furthermore, when siblings speak the SL more often with each other, this can influence HL outcomes negatively (Altman et al., 2014; Rojas et al., 2016). Because the Syrian refugee families in Canada tend to be large (IRCC, 2018, 2019), sibling interaction in particular was expected to play a key role in bilingual outcomes in the present study, either directly or as mediators of the influences of socioemotional development. Accordingly, in the present study, language interaction was measured for each interlocutor.

Richness of language activities refers to the qualitative properties, diversity, and complexity in children's language environment, which can be measured by the frequency of children engaging in audiovisual media, print materials, socializing activities, and extracurricular activities (Paradis, 2023). Richness of the language environment contributes uniquely to bilingual children's SL and HL abilities, beyond quantity of input in the SL and HL (Kaltsa et al., 2020; Jia & Paradis, 2015; Paradis & Jia, 2017; Pham & Tipton, 2018; Soto-Corominas et al., 2020; Sun et al., 2020). Because the Syrian refugee children in the present study arrived as a cohort in Canada, the quantity of exposure to their English-SL does not vary substantially among them, in contrast to the richness of their SL and HL environments (Paradis et al., 2020). In addition, the richness of the HL environment can be more complex in refugee populations compared to second-generation immigrant children. On one hand, refugee children arrived in the host country at a variety of ages, so a richer HL environment is more likely to persist for some (Paradis et al., 2020). On the other hand, as mentioned earlier, many Syrian refugee children have limited schooling experiences in their HL, and their families tend to have more limited financial and educational resources (Hadfield et al., 2017); therefore, literacy and extracurricular activities might be limited in their contribution to a rich HL environment. Nonetheless, Arabic is used in faith practices among Syrian refugee populations in Canada, and thus, there may be broader support for Arabic as an HL than there would be for many other minoritized languages. Indeed, existing studies with refugee children in Canada have found that literacy skills and social activities make different contributions to variance in refugee children's HL outcomes (Paradis et al., 2020; Soto-Corominas et al., 2022). Accordingly, in the present study, the richness of the language environment was measured through the frequency of specific types of activities.

Methodological considerations for individual differences studies

The previous sections reviewed research on several factors associated with individual differences (ID) in bilingual children's abilities in the SL and HL, including acculturation, well-being, and language environment. Most studies examining ID factors and bilingual development have used regression modeling (predictor-outcome) analyses (e.g., Armon-Lotem *et al.*, 2014; Soto-Corominas *et al.*, 2022; Sun *et al.*, 2018; Whiteside *et al.*, 2017; Winsler *et al.*, 2014) and have used aggregated predictor variables about well-being, acculturation, and language environment, respectively, through questionnaires (e.g., Kaltsa *et al.*, 2020; Oh & Fuligni, 2010; Pham & Tipton, 2018; Sun *et al.*, 2020). While this body of research has provided substantial insights, there are some limitations in these methods that we sought to address in the present study. First, regression modeling yields information about how ID factors individually specify variance in outcomes, but it does not yield much information about how these ID factors are related to each other and whether the outcomes are impacted directly or through mediation (De Cat & Unsworth, 2023). Accordingly, the present study adopted structural equation modeling (SEM), because it permits the detection of both direct and indirect (mediated) associations between ID factors and bilingual outcomes. A second limitation of prior research is the reliance on aggregate scores, or predetermined section scores, from questionnaires to measure ID factors. For example, the acculturation questionnaire used in the present study could yield four aggregate scores based on sections with questions about the (1) heritage language (HL), (2) heritage culture, (3) host language (SL), and (4) host culture (Kukaswadia *et al.*, 2016). However, when Kukaswadia *et al.* (2016) validated this bicultural questionnaire using factor analysis, they found questions about identification with the host culture and language grouped together, but questions about heritage culture and language formed two separate groups. Furthermore, as mentioned in the section *Language Environment and Bilingual Outcomes*, disaggregated scores have revealed unique contributions of interlocutor and particular language activities on children's outcomes. Therefore, in the present study, we used factor analysis to determine the emerging dimensions from the item responses on the questionnaires instead of predetermined sections or aggregate scores. These dimensions formed *macro-variables* as predictors in our analyses. Similar procedures were used for the battery of language tasks to form macro-variables for SL and HL outcomes.

The present study

The present study aimed to understand first-generation Syrian refugee children's socioemotional development, *i.e.*, acculturation and well-being difficulties, and its association with individual differences in bilingual outcomes 4.5 years after resettling in Canada. Towards this end, youth self-reports on acculturation, well-being, and language environment factors were gathered. Language outcomes in English and Arabic (receptive vocabulary, sentence repetition, narrative production, narrative comprehension, word reading, and reading comprehension) were obtained through direct assessment. Our research questions were as follows:

Our first set of research questions (RQ1) is related to the characteristics of socioemotional development: What are the characteristics of Syrian refugee

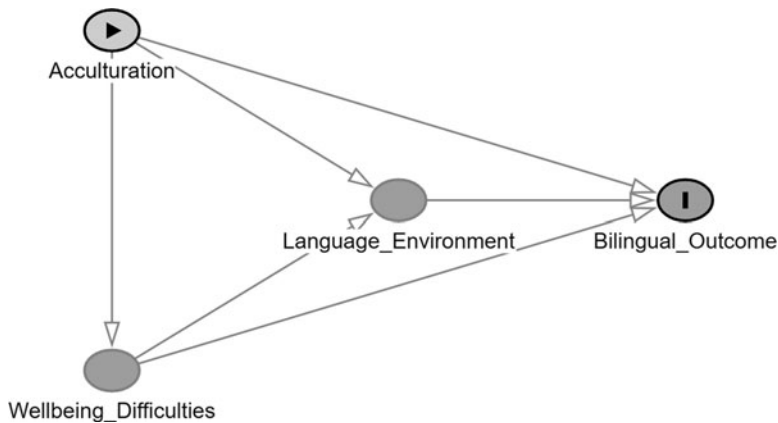


Figure 1. A directed acyclic graph (DAG; Textor et al., 2016) to conceptualize the direct and mediated associations between ID factors and bilingual outcomes (language proficiency in the SL and HL): socioemotional development factors (acculturation and well-being difficulties) as the input, language environment factors (language interaction at home and language-rich activities) as mediators, and the SL and HL test scores as the output.

children's acculturation measured with the bicultural framework? What are the characteristics of their well-being difficulties measured by problem and prosocial behaviors compared to normative data? Descriptive statistics and pairwise comparisons were used to answer these questions.

Our second set of research questions (RQ2) is related to ID factors' roles in bilingual outcomes: What are the associations among acculturation, well-being, and language environment factors with bilingual outcomes in the English-SL and Arabic-HL? Are these associations direct or mediated? Do such associations differ across the SL and HL? Are there associations between acculturation and well-being? To answer these questions, factor analysis was used to derive macro-variables, and structural equation modeling was used to detect associations between ID factors and bilingual outcomes.

Figure 1 is a directed acyclic graphic (DAG), which displays the hypothesized direct and mediated associations among variables that were expected to emerge from our analyses. It shows how socioemotional development (acculturation and well-being difficulties) could influence the language environment, which, in turn, influences bilingual outcomes. It also shows possible concurrent direct associations between socioemotional development and bilingual outcomes, as well as the possible association between acculturation and well-being difficulties.

Based on the literature reviewed, we make specific hypotheses about the paths in Figure 1: (1) direct path: stronger cultural affiliation with Canadian and Syrian cultures is related to better language outcomes in English and Arabic, respectively; (2) direct path: more well-being challenges are related to less ideal language outcomes, particularly in English as the L2; (3) mediated paths: both acculturation and well-being challenges influence the child's language use when interacting with family members and the child's engagement in language-rich activities, i.e., their language environment. The latter, in turn, influences language outcomes in both

English and Arabic, whereas the interactions with different interlocutors and the engagement in different types of activities may have different effects; and (4) the possible path between acculturation and well-being difficulties is for exploration.

Method

Participants

The data in this study were drawn from the third wave of data collection in a longitudinal study on Syrian refugee children's bilingual development. The participants included 112 children (61 girls) who arrived in Canada at an average age of 7.38 years ($SD = 2.01$, range = [3.75, 11.67]). In addition to English, all families spoke Arabic only and no other language (e.g., Kurdish). At the time of data collection, these children's average age was 11.97 years ($SD = 1.91$, range = [8.58, 16.08]), which means they had lived in Canada for 4.59 years on average ($SD = 0.58$, range = [2.58, 5.67]). Even though some participants were adolescents, they are all referred to as "children" throughout this study for simplicity. All children were living in an English-majority city in Canada and attending English-medium schools at the time of testing. Prior to their resettlement in Canada, these children had minimal or no exposure to English. Among them, 34.82% had experience in a refugee camp in Jordan, Lebanon, or Turkey. Eighty-four children arrived in Canada after age 6, while 29 of them had an interrupted school experience in Arabic (years of school in Arabic were fewer than expected at the age of arrival, assuming the child started school at age 7). Further information about the participants' socioemotional development and bilingual development is presented in the *Results* section.

Procedures

Youth self-report questionnaires on acculturation, well-being, language interaction, and language-rich activities were available in both the HL (Arabic) and the SL (English) and were administered in the participant's preferred language. Language learning outcomes were measured in both English and Arabic with randomized orders of languages and tasks. Due to the COVID-19 pandemic, data collection sessions were conducted online through the Zoom video-conferencing platform. A trained research assistant shared their computer screen and audio to present visual and audio stimuli. The child wore a noise-cancelling headphone during the session and was audio-recorded. Minor data loss occurred due to technical issues such as network interruptions. For example, there was a 2.4% loss in English and a 3.6% loss in Arabic Sentence Repetition Tasks. Tasks that were not time-dependent or audio-dependent (e.g., questionnaires and receptive vocabulary tests) were not influenced by the online formatting.

Bicultural Youth Acculturation Questionnaire (BYAQ; Kukaswadia et al., 2016)

In the BYAQ, the child was asked a series of questions about how they identified with the host culture and the heritage culture and language. The host culture questions inquired about how much the child identified with Canadian values,

norms, and beliefs, in addition to a general question on the child's comfort speaking English. The heritage culture questions inquired about how much the child identified with Syrian values, norms, and beliefs. The heritage language questions also inquired about how much the child enjoyed using Arabic across a variety of contexts. All questions were formed as statements, and children responded on a 5-point scale to indicate the degree to which they agreed with each statement, where 1 indicated "strongly disagree" and 5 indicated "strongly agree," with the option of "prefer not to answer." There were incidental nonresponses to questions (3.0%). Item-level responses were used in the analyses.

Strengths and difficulties questionnaire—self-report version (SDQ-SR; Goodman et al., 1998)

The SDQ is a behavioral screening questionnaire for children and adolescents used to assess problematic behaviors and index difficulties in well-being (Goodman & Goodman, 2009; Stone et al., 2010). It has been normed in several countries, such as Australia, Britain, Japan, and the United States, and used in the Canadian context (Hoffmann et al., 2020), although it should be noted that it was not designed particularly for refugee populations. The self-report version (SDQ-SR) used in the present study is suitable for children who are approximately 11 to 17 years old (Goodman et al., 1998; Richter et al., 2011; Theunissen et al., 2019). With the support of Arabic-speaking and English-speaking research assistants, the SDQ-SR was conducted successfully with the children in this study whose ages were within or slightly below the intended age group of the tool (40 out of 112 children were below 11 years of age, with a minimum age of 8.58 years).

The SDQ-SR included 25 items, which were divided into five scales: conduct problems, hyperactivity/inattention, emotional symptoms, peer relationship problems, and prosocial behaviors. Each scale ranged between 0 and 10. For the first four scales, a higher number indicated a higher prevalence of problems and difficulties. For the last scale, a higher number indicated a higher prevalence of prosocial (*i.e.*, positive) behaviors. The five scale scores were used in the analyses. The Cronbach's α for SDQ-SR was .78.

Alberta Language Environment Questionnaire—4 (ALEQ-4; Paradis et al., 2020)

The ALEQ-4 questions about children's language use with their family members and their engagement in language-rich activities in Arabic and English were adapted for self-report. Item-level responses were used in the factor analyses.

First, children were asked to report how much Arabic versus English they used with a variety of interlocutors at home. Language output from the child and language input to the child were measured separately. Interactions with the mother, father, older siblings, and younger siblings were measured separately. Children responded to each question on a 5-point scale, where 1 indicated "mainly or only Arabic; 80%–100% Arabic and 0%–20% English" and 5 indicated "mainly or only English; 0%–20% Arabic and 80%–100% English." Where a certain interlocutor was unapplicable for the child (4 children did not report on interactions with the father, 18 did not report on older siblings, and 20 did not report on younger siblings), the

data was imputed from the available responses on the other interlocutors using the mice package (van Buuren & Groothuis-Oudshoorn, 2011). Imputation, instead of other handling methods such as listwise deletion, was chosen to preserve the participants and retain the sample size.

Second, children were asked to report how frequently they engaged in certain language-rich activities throughout an average week. These scales were asked for in English and Arabic separately, so in principle, a child could engage in language-rich activities frequently in both languages. These questions concerned the following: speaking/listening activities (e.g., watching shows, listening to music, and video chatting), reading/writing activities (e.g., reading books, magazines, websites, and messaging), reading only for pleasure (e.g., reading novels, as opposed to reading for specific goals like homework or finding information), extracurricular activities (e.g., religious services, community events, sports, music, and after-school programs), and language use when socializing with friends. There was also one question about Arabic HL classes outside of school. Children responded to each question on a 5-point scale, where 1 indicated “almost never; <1 hour,” and 5 indicated “very often; 20+ hours,” with the option of “not applicable.” Where the child indicated that the questions related to reading, writing, or language classes were “not applicable,” it was interpreted as no opportunity to engage in such activities, and the responses were coded as an additional level, “0.” Note that these questions differed from linguistic acculturation questions: these questions asked about the frequency of engagement, while the acculturation questions asked about the enjoyment of such activities.

Language measures in English and Arabic

The language outcome measures included receptive vocabulary, sentence repetition, narrative, word reading, and reading comprehension tasks in both English and Arabic. English tasks were all in North American English. Word reading and reading comprehension tasks in Arabic were in Modern Standard Arabic (MSA). The story which the participants listened to for narrative comprehension was in MSA as well, to align with the variety that would be used in book-reading activities with children. All other Arabic tasks were carried out in the Syrian Arabic variety, including narrative production. The use of two varieties in the test battery for oral vs. written language reflects the diglossic context in the Arabic-speaking world (Albirini, 2016). These tasks are summarized in Table 1. Raw scores on all the tasks for each language were used to derive outcome macro-variables(s) in that language via factor analysis.

It should be noted that for word reading and reading comprehension, all 112 children completed sufficient items in the English tasks, but not all children were able to perform the tasks in Arabic. Three children did not respond to any items on the Arabic word reading task; all these three children had no schooling experience in Arabic (where MSA is the medium of instruction), and two arrived in Canada before school entry. Six children did not respond to any items on the Arabic reading comprehension task; all these six children had no schooling experience in Arabic, and five arrived in Canada before school entry.

Table 1. Tasks for language outcomes in English (top line within each row) and Arabic (bottom line within each row)

Language skill	Description	Title (Reference)	Possible maximum score	Cronbach's α
Receptive vocabulary	For each item, the child was presented with four pictures and pointed to the one that corresponded to the word provided by the examiner.	Peabody Picture Vocabulary Task – 4 th Edition (PPVT-4, Dunn & Dunn, 2007)	228	.97
		Arabic Language Assessment Battery – Vocabulary Subtest (ALAB-V; Asadi et al., 2015)	73	.93
Sentence repetition	The child repeated after 31 pre-recorded sentences which had different levels of morphosyntactic complexity. Accuracy rates were used in the analyses.	Sentence Repetition Task (Soto-Corominas et al., 2022)	1	.88
			1	.90
Narratives (comprehension)	The child listened to a story accompanied by a picture and answered literal and inferential questions.	Test of Narrative Language (TNL; Gillam & Pearson, 2004)	13	.60
		TNL adapted and translated into Arabic	13	.68
Narratives (production)	The child told a story as completely as possible according to a picture, and their story was scored based on story grammar, cohesion, and coherence.	TNL (Gillam & Pearson, 2004)	30	.76
		TNL adapted and translated into Arabic	30	.74
Word reading	The child identified letters by their names, named letters, and read aloud English words that became progressively more challenging.	Woodcock-Johnson III Tests of Achievement – Letter-Word Identification Subtest (Woodcock et al., 2002)	76	.96
	The child read aloud Arabic words. Written words were presented with vowelized MSA.	A similar word reading task in Arabic (Tibi & Kirby, 2017)	100	.99

(Continued)

Table 1. (Continued)

Language skill	Description	Title (Reference)	Possible maximum score	Cronbach's α
Reading comprehension	The child read a short passage silently and filled in the blank verbally.	Woodcock-Johnson III Tests of Achievement – Passage Comprehension (Woodcock et al., 2002)	47	.88
	The child chose the sentence out of three choices that best represented a picture and answered multiple-choice questions after reading a short passage.	A similar reading comprehension task adapted from Asadi et al. (2015) and Mahfoudi (2010)	44	.97

Data analysis

Data analyses were conducted in R 4.2.3 (R Core Team, 2022). Questionnaire responses on 5-point scales were coded as ordinal, and the SDQ-SR scale scores and language test scores were coded as numeric variables. Missing data due to no response (1.49%) were imputed from the available relevant measures using the mice package (van Buuren & Groothuis-Oudshoorn, 2011). Descriptive statistics and paired Wilcoxon signed-rank tests were used to address RQ1 about the characteristics of Syrian refugee children's socioemotional development. A two-step analysis procedure was used for RQ2. First, factor analysis was conducted using the psych package (Revelle, 2023). This method was chosen to achieve two goals: (a) to determine the dimensions emerging from item responses on the questionnaires and raw scores on the language tasks and to create macro-variables for each dimension, and (b) to create fewer variables overall to simplify the specification of structural equation models (SEMs). Second, SEM was performed using the lavaan package (Rosseel, 2012) to detect direct and mediated associations between ID factors and language outcomes in English and Arabic. Details of statistical methods are reported along with the relevant results.

Results

Characteristics of Syrian refugee children's socioemotional development

Syrian refugee children's self-reported acculturation

Children's responses to the acculturation questionnaire (BYAQ, Kukaswadia et al., 2016) are displayed in Figure 2. For most items, the children's responses had a median of 4 out of the 5-point scales for both the host and heritage cultures/languages. Specifically, children reported high levels of comfort speaking both English and Arabic, strong beliefs in both Canadian and Syrian values, strong pride

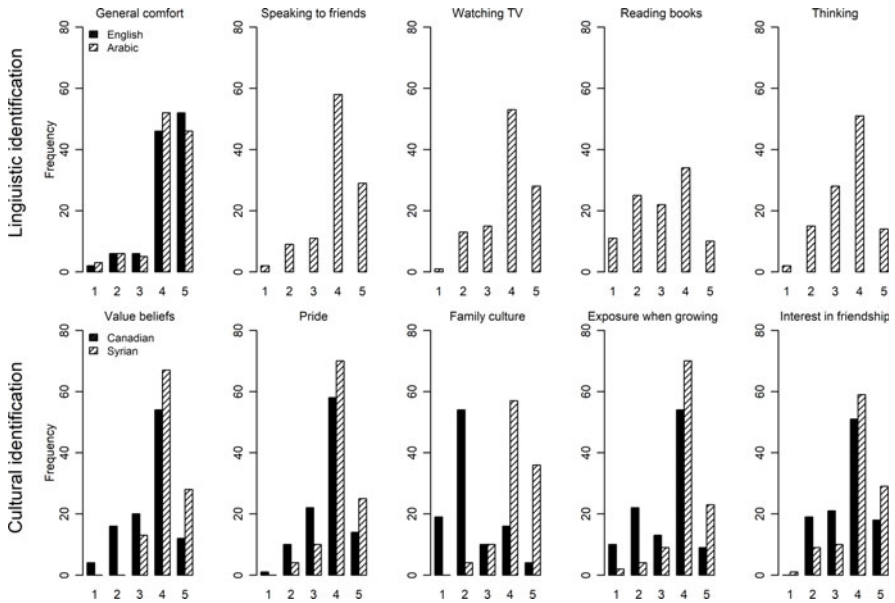


Figure 2. Distributions of children's responses to the BYAQ. Identification with the host culture is plotted in black bars, and identification with the heritage culture/language is plotted in shaded bars. The top row presents linguistic identification (i.e., the child's general comfort speaking the language and the enjoyment of carrying out activities in the language), and the bottom row presents cultural identification (i.e., the child's values, family culture, and interest in making friends from the culture). In each plot, the x-axis indicates the levels on the 5-point scale, and the y-axis indicates the frequency (number of children who chose this level on the scale).

in Canadian and Syrian cultures, ample exposure to Canadian and Syrian cultures, and strong desires to make Canadian and Syrian friends. The only two items with lower responses on the scales were related to whether children were raised in a way that was consistent with Canadian culture (median = 2) and whether children enjoyed reading books in Arabic (median = 3).

Paired Wilcoxon signed-rank tests were conducted to compare the children's identification with the host culture versus the heritage culture. Results suggested that the refugee children indicated stronger identification with their heritage culture than the host culture, including more agreement with Syrian values ($V = 285$, $p < .001$), more pride in Syrian culture and achievements ($V = 327.5$, $p = .002$), being raised in a way that was more consistent with Syrian culture ($V = 63$, $p < .001$), growing up exposed to more Syrian culture ($V = 254$, $p < .001$), and the desire to make more Syrian friends ($V = 429.5$, $p = .002$). However, children indicated the same levels of comfort using both Arabic and English ($V = 703.5$, $p = .513$).

Syrian refugee children's self-reported well-being difficulties

Children's responses to the well-being questionnaire (SDQ-SR, Goodman et al., 1998) are presented in Table 2, along with normative references (NHIS, 2004). A considerable number of children in this study fell in the bands of "abnormal (the

Table 2. SDQ-SR descriptive statistics and normative references* of 11–14-year-olds in the United States (NHIS, 2004). For the first four scales, higher scores indicated more problems. For the last scale, higher scores indicated more prosocial behaviors. In the norm, the “abnormal” category captures the bottom 10% of the population, and the “borderline” category captures the next 10% of the population

Scale	<i>M</i> (<i>SD</i>)	Abnormal criteria	<i>N</i> (%) of children in the “abnormal” category	Borderline criteria	<i>N</i> (%) of children in the “borderline” category	Sum <i>N</i> (%) of children in the “abnormal” and “borderline” categories
Conduct problems	1.86 (1.73)	> 3	23 (20.54%)	3	10 (8.93%)	33 (29.47%)
Hyperactivity-inattention	3.40 (2.04)	> 6	10 (8.93%)	6	24 (21.43%)	34 (30.36%)
Emotional problems	3.15 (2.23)	> 4	37 (33.04%)	4	14 (12.50%)	51 (45.54%)
Peer problems	3.37 (1.35)	> 3	26 (23.21%)	3	20 (17.86%)	46 (41.07%)
Prosocial behavior	8.38 (1.04)	< 6	7 (6.25%)	6 – 7	17 (15.18%)	24 (21.43%)

*Note: This norm was among the general population in the United States based on parent report. Therefore, it is not directly comparable to the refugee children in the present study and the data collected through self-report.

last 10% of the population)” or “borderline (the second-to-last 10% of the population)” in their well-being difficulties (Bourdon et al., 2005; Goodman, 1997; He et al., 2013). Specifically, the proportions of children in the “abnormal” band for each scale were 20.54% for conduct problems, 8.93% for hyperactivity, 33.04% for emotional problems, 23.21% for peer problems, and 6.25% for reduced prosocial behaviors, and the proportions of children in the “borderline” bands were 8.93% for conduct problems, 21.43% for hyperactivity, 12.50% for emotional problems, 17.86% for peer problems, and 15.18% for limited prosocial behaviors.

ID factors’ roles in Syrian refugee children’s bilingual outcomes

A two-step procedure: factor analysis (FA) and structural equation modeling (SEM)

In the current study, as the first step in addressing our RQ2, FAs were conducted using the psych package (Revelle, 2023) for responses to the BYAQ, the five scales in SDQ-SR, language interaction and language-rich activity questions in ALEQ, and the scores on English and Arabic language tests, respectively. The goal was to explore how responses cluster together to form broader dimensions/macro-variables (Sardegna et al., 2014; Smit & Dalton, 2000) in order to prepare the data for further statistical modeling (Sardegna et al., 2018). Details about the analysis procedures and the results for each FA are in the Supplementary Materials. What follows here in Table 3 is a summary of the macro-variables derived from the FAs.

The next step in addressing RQ2 was to detect associations among ID factors and bilingual outcomes. SEMs were performed using the lavaan package (Rosseel, 2012) to detect direct and indirect (mediated) associations among variables

Table 3. Macro-variables derived from FAs

Shortened name	Description	Relevant items/scales/tests from questionnaires or language testing batteries
Acculturation		
Child_Can_Culture	The child's current identification with Canadian culture.	The child's agreement with Canadian values, pride in Canadian culture and achievements, interest in having Canadian friends, and comfort of speaking English.
Family_Can_Culture	The family's Canadian cultural environment when raising the child.	The child's being raised in a way that was consistent with Canadian culture and exposure to Canadian culture growing up.
Child_Syr_Culture	The child's identification with Syrian culture.	The child's being raised in a way that was consistent with Syrian culture, exposure to Syrian culture growing up, agreement with Syrian values, pride in Syrian culture and achievements, interest in having Syrian friends, and enjoyment of reading books in Arabic.
Child_Arabic_Enjoy	The child's enjoyment of language activities in Arabic.	The child comfort of speaking Arabic, comfort of speaking Arabic with friends, enjoyment of watching TV in Arabic, and thinking in Arabic.
Well-being		
Wellbeing_Difficulties	More problem behaviors and fewer prosocial behaviors.	The five scales of SDQ-SR, including conduct problems, hyperactivity/inattention problems, peer relationship problems, emotional problems, and prosocial behaviors.
Language environment		
Input_Parent_to_Child	Home language input from parents to the child.	The mother's and the father's language use to the child at home ^a .
Interaction_Child_with_Sibs	Home language interaction with younger and older siblings.	The child's language use to younger siblings and older siblings at home ^{a, b} .
Output_Child_to_Father	Home language output from the child to their father.	The child's language use to the father at home ^a .
Activities_English_All	Richness of language activities in English.	The weekly amount of time spent on reading for pleasure, reading/writing activities, speaking/listening activities, extracurricular activities, and playing with friends in English.

(Continued)

Table 3. (Continued)

Shortened name	Description	Relevant items/scales/tests from questionnaires or language testing batteries
Activities_Arabic_Literacy	Richness of literacy activities in Arabic.	The weekly amount of time spent on reading for pleasure and reading/writing activities in Arabic.
Activities_Arabic_ExCurric	Richness of extracurricular activities in Arabic.	The weekly amount of time spent on Arabic classes outside of school and religious services in Arabic.
Activities_Arabic_Media_Social	Richness of media and social activities in Arabic.	The weekly amount of time spent on speaking/listening over Arabic media and playing with friends in Arabic.
Language proficiency in English and Arabic		
English_All	Language outcomes in English.	Scores of English reading comprehension, sentence repetition, word reading, receptive vocabulary, narrative production, and narrative comprehension tasks.
Arabic_Vocab_Grammar_Read	Language outcomes in Arabic vocabulary, word reading, and sentence repetition.	Scores of Arabic receptive vocabulary, word reading ^c , and sentence repetition tasks.
Arabic_Narrative	Language outcomes in Arabic narrative language skills.	Scores of Arabic narrative production and narrative comprehension tasks.

Notes:

a.Higher numbers indicate more English use, and lower numbers indicate more Arabic use.

b.The child's language use to their siblings was highly correlated to the siblings' language use to the child, respectively for younger and older siblings ($r_s > .9$).

c.Arabic word reading was highly correlated to Arabic reading comprehension ($r > .9$).

(Sardegna et al., 2018; Tibi et al., 2019). SEMs were carried out separately for English and Arabic outcomes but with the same ID factors. The FA scores were used in the models. As indicated in the DAG (Figure 1), socioemotional development (acculturation and well-being) was hypothesized to directly predict bilingual outcomes, as well as mediated effects through the language environment. In addition, it was possible that acculturation's effects were partly mediated by well-being. Model comparisons started with a full model. Variables with insignificant effects were removed stepwise if the Akaike information criterion (AIC) was not increased by 2 or more. The final selected models for English and Arabic outcomes were visualized using the lavaanExtra package (Thériault, 2022). Standardized coefficients (β s) were used to allow comparing the effect magnitudes across different paths.

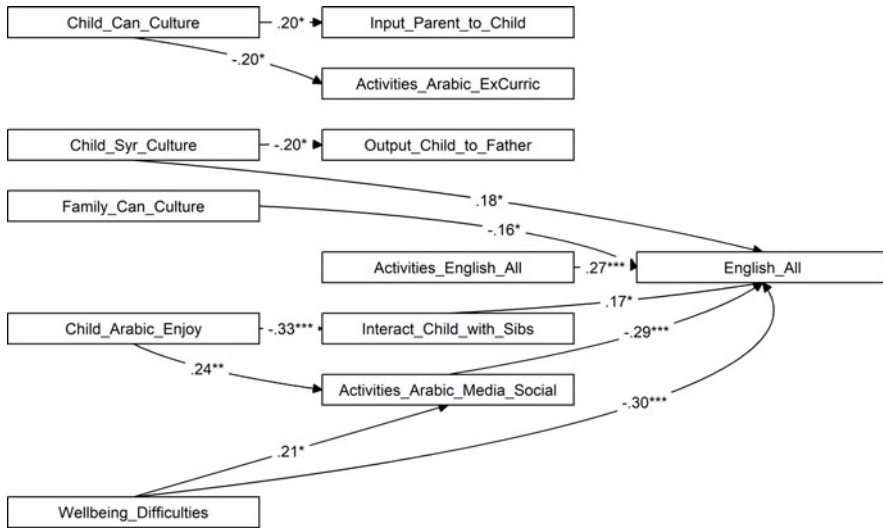


Figure 3. Socioemotional development variables' associations with English outcomes (* $p < .05$, ** $p < .01$, *** $p < .001$). Socioemotional development variables (acculturation and well-being difficulties) are listed on the left. Language environment mediators (language interaction variables and language-rich activity variables) are listed in the middle. The English outcome variable is on the right.

SEM of English outcomes

The SEM for English outcomes is illustrated in Figure 3. Socioemotional development had both direct and mediated effects on the children's English outcomes (*English_All*). Three direct paths from socioemotional development variables to English outcomes were identified. First, the child's current identification with Syrian culture (*Child_Syr_Culture*) was positively related to their English outcomes ($\beta = .18$, $p = .011$). Second, child-reported Canadian acculturation in the family environment (*Family_Can_Culture*) was negatively related to their English outcomes ($\beta = -.16$, $p = .027$). Third, well-being difficulties were negatively related to English outcomes ($\beta = .30$, $p < .001$), i.e., fewer well-being difficulties were related to better English outcomes.

Three mediating paths were identified. First, the child's enjoyment of Arabic activities (*Child_Arabic_Enjoy*) had a negative influence on their language interaction with siblings (*Interaction_Child_with_Sibs*). As a reminder, higher scores in language interaction indicated more use of English than Arabic. Therefore, more enjoyment in Arabic language activities was related to less English—and more Arabic—interaction with siblings ($\beta = -.33$, $p < .001$). Subsequently, *Interaction_Child_with_Sibs* was positively related to English outcomes ($\beta = .17$, $p = .019$). Therefore, overall, *Child_Arabic_Enjoy* had a weak negative association with their English outcomes, mediated by *Interaction_Child_with_Sibs* ($\beta = -.06$, $p = .043$; statistics of mediation effects were calculated using Soper, 2023). Second, *Child_Arabic_Enjoy* had a positive effect on their speaking/listening over media and engagement in social language activities in Arabic (*Activities_Arabic_Media_Social*) ($\beta = .24$, $p = .006$). Third, the child's well-being difficulties (*Wellbeing_Difficulties*) also had a positive association with

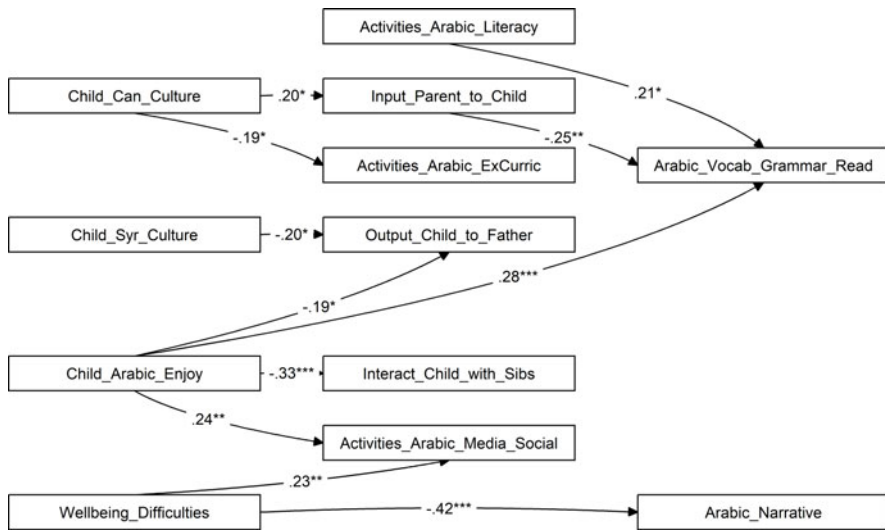


Figure 4. Socioemotional development variables' associations with Arabic outcomes (* $p < .05$, ** $p < .01$, *** $p < .001$). Socioemotional development variables (acculturation variables and well-being difficulties) are listed on the left. Language environment mediators (language interaction variables and language-rich activity variables) are listed in the middle. The Arabic outcome variables are on the right.

Activities_Arabic_Media_Social ($\beta = .21$, $p = .018$); that is, children who had more well-being difficulties tended to choose to engage more in media and social interactions in Arabic, their HL. In turn, *Activities_Arabic_Media_Social* had a negative association with English outcomes ($\beta = .29$, $p < .001$). As a result, *Child_Arabic_Enjoy* and *Wellbeing_Difficulties* both had a weak negative effect on English outcomes ($\beta = -.07$, $p = .023$; $\beta = -.06$, $p = .042$, respectively), mediated by *Activities_Arabic_Media_Social*. No mediation paths were detected between acculturation and well-being difficulties. In addition, one path was found for language environment and English outcomes without the influence from socioemotional development; namely, English outcomes were stronger if the child engaged in more language-rich activities in English (*Activities_English_All*) ($\beta = .27$, $p < .001$).

Finally, acculturation had significant effects on language environment variables that were not associated with English outcomes in our model. Specifically, the child's identification with Canadian culture (*Child_Can_Culture*) was related to more English input from parents (*Input_Parent_to_Child*) ($\beta = .20$, $p = .020$) and less engagement in extracurricular activities in Arabic (*Activities_Arabic_ExCurric*) ($\beta = -.20$, $p = .022$). The child's identification with Syrian culture (*Child_Syr_Culture*) was related to less English output to their father (*Output_Child_to_Father*) ($\beta = -.20$, $p = .024$).

SEM of Arabic outcomes

The SEM for Arabic outcomes is illustrated in Figure 4. Unlike English, Arabic outcomes loaded on two macro-variables, one related to vocabulary, grammar, and

word reading (*Arabic_Vocab_Grammar_Read*), and the other related to narrative skills (*Arabic_Narrative*).

In terms of the outcomes for *Arabic_Vocab_Grammar_Read*, acculturation had both direct and mediated effects. One direct path was identified: the child's enjoyment of Arabic language activities (*Child_Arabic_Enjoy*) had a positive effect on Arabic outcomes ($\beta = .28, p = .001$). One mediating path was identified between acculturation and outcomes for *Arabic_Vocab_Grammar_Read*: the child's stronger identification with Canadian culture (*Child_Can_Culture*) was related to more English input—and less Arabic input—from parents to the child (*Input_Parent_to_Child*) ($\beta = .20, p = .027$), and the latter had a negative effect on Arabic outcomes ($\beta = -.25, p = .003$). The effect of the full path trended towards significance ($\beta = -.05, p = .075$). The effects of acculturation were not found to be mediated by well-being difficulties, nor did the latter have any association with *Arabic_Vocab_Grammar_Read*. One direct path was found for language environment and *Arabic_Vocab_Grammar_Read* outcomes without influence from socioemotional development; namely, Arabic outcomes were stronger if the child engaged in more literacy activities in Arabic (*Activities_Arabic_Literacy*) ($\beta = .21, p = .010$).

Turning to the outcomes for *Arabic_Narrative*, these were directly and negatively associated with well-being difficulties with a considerable magnitude ($\beta = -.42, p < .001$). Notably, *Arabic_Narrative* was not associated with acculturation or language environment variables.

As with the English model, acculturation and well-being variables had significant effects on language environment variables that were not associated with Arabic outcomes. First, some associations between acculturation and language interaction parallel findings from the English SEM. For example, *Child_Syr_Culture* and *Child_Arabic_Enjoy* were associated with less English—and more Arabic—output to their fathers (*Output_Child_to_Father*; $\beta = -.20, p = .025$; $\beta = -.19, p = .031$, respectively). Furthermore, *Child_Arabic_Enjoy* was associated with reduced English interaction with their siblings (*Interaction_Child_with_Sibs*; $\beta = -.33, p < .001$). Regarding *Activities_Arabic_Media_Social*, increased engagement in such activities was associated with *Child_Arabic_Enjoy* ($\beta = .24, p = .006$) and with *Wellbeing_Difficulties* ($\beta = .23, p = .008$). Finally, *Child_Can_Culture* was associated with reduced engagement in extracurricular activities in Arabic (*Activities_Arabic_ExCurric*; $\beta = -.19, p = .034$).

Discussion

This study examined the associations between ID factors and the bilingual outcomes of Syrian refugee children 4.5 years after arriving in Canada, with a focus on the effects of socioemotional development. The main research objectives included examining the characteristics of refugee children's socioemotional development, specifically acculturation and well-being difficulties, and determining whether socioemotional development variables had direct and mediated effects on bilingual outcomes in the English-SL and Arabic-HL. The results revealed that the Syrian refugee children were developing an integration orientation of acculturation while

still having measurable well-being difficulties after residing in Canada for several years. Results also showed that socioemotional development variables had both direct and mediated associations with bilingual outcomes. Mediated associations were through language interaction and language richness factors.

Characteristics of Syrian refugee children's socioemotional development

Our RQ1 was to understand the characteristics of socioemotional development of Syrian refugee children who resettled in Canada, including their acculturation and socioemotional well-being. Children in the present study reported high levels of agreement with both Canadian and Syrian cultures and comfort speaking both English and Arabic, which indicated an integration orientation of acculturation (Berry, 2005; Kukaswadia *et al.*, 2016). The only exceptions to high levels of agreement were for whether children were raised in a way that was consistent with Canadian culture and whether children enjoyed reading books in Arabic. It was unsurprising that these late-arriving migrant children reported that they were raised in a way that was consistent with Syrian culture instead of Canadian, and the lower ratings for the enjoyment of Arabic book reading were possibly related to limited schooling opportunities and literacy skills in Arabic. Previous studies indicated that a high proficiency in the language, whether it was SL or HL, was related to a strong identification with the corresponding culture (Armon-Lotem *et al.*, 2014; Bankston & Zhou, 1995; Jia, 2008; Oh & Fuligni, 2010; Phinney *et al.*, 2001). Therefore, Syrian refugee children's high levels of self-reported comfort speaking in both the SL and HL could have provided a foundation for them to develop and maintain a strong bicultural identity. High levels of affiliation with both cultures notwithstanding, children reported stronger identification with the heritage culture overall, indicating maintenance of the heritage culture alongside development towards a balanced biculturalism.

In terms of well-being, the results revealed that many children were experiencing difficulties 4.5 years post resettlement. A high proportion of children in the present study scored in the "borderline" and "abnormal" categories of SDQ-SR (Goodman *et al.*, 1998). Our results indicated that more refugee children were presenting with well-being difficulties compared to similar-aged peers in North America on all scales for problem behaviors, *i.e.*, conduct problems, hyperactivity/inattention, emotional symptoms, and peer relationship problems. Moreover, these proportions were larger compared to parent-reported SDQ for the same cohort 3 years post resettlement in Canada (Paradis *et al.*, 2022). There are several possible explanations for this gap. First, refugee families' and children's perception of well-being difficulties might have increased over time. Vitoroulis *et al.* (2023) observed a decline in well-being in terms of school belonging. They suggested that refugee children started their residency in Canada with a positive perception of belonging but indicated a sense of disappointment as they stayed in the host country over time and encountered emerging challenges during resettlement. Another reason could be the documented gap between children's self-reports on mental well-being and their parents' reports as a proxy (Northfield *et al.*, 2024). Particularly, the proportions of children who self-reported emotional and peer problems in the present study were considerably higher compared to their parents' report 1.5 years earlier. This is in line

with the evidence that children's self-reports were more reliable in internalizing difficulties such as emotional and peer problems (Aebi et al., 2017; Paradis et al., 2022). Finally, the data in the present study were collected during the pandemic when children were experiencing school closure and online teaching, and research has found that migrant children's well-being was particularly worsened during this time, as the pandemic compounded pre-existing poverty and hardship (Jones et al., 2022; Patrick et al., 2020).

Associations among ID factors and bilingual outcomes

Our RQ2 was to understand the multidirectional associations between the Syrian refugee children's bilingual outcomes and their ID factors. As the DAG (Figure 1) specified, we anticipated socioemotional development (acculturation and well-being) would influence bilingual outcomes directly, and there would be an indirect influence through the mediation of language environment. We also anticipated an association between acculturation and well-being difficulties. These hypotheses were partly supported by the findings from SEMs in the present study.

Direct associations between acculturation and bilingual outcomes

The SEM results suggested direct associations between acculturation and bilingual outcomes, as depicted in the DAG (Figure 1) and Hypothesis (1). However, such direct paths were only detected for certain components of the acculturation measures, and the paths were different for the English-SL and the Arabic-HL.

Perhaps most interestingly, the SEM for the SL suggests that the child's heritage-cultural identity had a positive association with their English-SL outcomes. A plausible interpretation is that the maintenance of heritage identity, as an important component of migrant children's socioemotional development (Lindner et al., 2020; Oh & Fuligni, 2010), signaled an overall positive social adjustment and the harmony, authenticity, and integrity in one's identity and values. On the other hand, the child's agreement with the host culture did not have a positive effect on their SL outcomes. Furthermore, opposed to our hypothesis of a positive association between the affiliation with Canadian culture and outcomes in English, in this study, a child's family's affiliation with the host country's "mainstream" culture had a small, negative effect on outcomes in the SL (the "mainstream" language). This provides new evidence on the possible associations between acculturation and SL learning. For example, in contrast, in a study of young Russian-Hebrew children in Israel, second-generation bilingual children's positive attitudes towards the host culture were associated with better SL outcomes (Armon-Lotem et al., 2014). One might suspect that the parents' language policies influenced both acculturation and language outcomes at the same time as a confounder, rather than mediating the association, i.e., when the parents tried to use more SL, the child might perceive a stronger family assimilation to the host culture, and meanwhile, the parents' non-proficient SL input influenced the child's SL outcomes negatively. However, the SEM detected no path between the family's assimilation to the host culture and parents' SL use, and research evidence has suggested that parents' use of SL had little to no positive effect on the child's SL outcomes, but not a negative effect

(Chondrogianni & Marinis, 2011; Hammer et al., 2012; Place & Hoff, 2016). A more plausible explanation is that the pressure to assimilate into the host culture might have led to extra stress in the children's early migration experiences, which in turn affected their learning of SL. Further research is needed to determine which of the potential explanations for our findings is upheld. Overall, our findings are in line with previous studies where refugee children's learning was supported by the maintenance of a strong heritage-cultural connection and the *selective* adoption of the host culture (Graham et al., 2016).

As for the HL outcomes, the child's linguistic identification with the HL (i.e., their enjoyment of Arabic activities) had a strong, positive influence on Arabic outcomes. This is in line with the evidence among young Chinese-English bilingual adults who arrived in the States between ages 4 and 20, whose strong heritage identity was associated with higher HL proficiency (Jia, 2008).

In summary, the direct paths between acculturation and bilingual outcomes were nonparallel for the SL and HL. SL outcomes were found to be influenced by the child's cultural identification, including the positive influence of heritage culture maintenance and the negative influence of host culture assimilation. In this context, cultural identification variables were likely to be indicators or associates of social adjustment, which provided a foundation for SL learning. On the contrary, HL outcomes were influenced by the child's linguistic identification with the HL, where the enjoyment of HL-rich activities supported the maintenance and further development of the HL. As far as the direct paths are concerned, a strong heritage-cultural and HL identification seems to be overall beneficial for bilingual development, while host-cultural assimilation did not seem supportive of the SL development. Thus, results highlight the importance of heritage culture and HL maintenance in bicultural and bilingual development.

Mediated associations between acculturation and bilingual outcomes

The SEM results also detected associations between acculturation and bilingual outcomes that were mediated by language environment, as depicted in the DAG (Figure 1) and Hypothesis (3). Specifically, the child's enjoyment of HL activities was associated with more interaction with siblings in the HL (less interaction in the SL) and more engagement in media and social activities in the HL. In turn, such a preference for the HL influenced SL outcomes negatively. In contrast, the child's host-cultural identity was related to less use of the HL with parents, which, in turn, influenced HL outcomes negatively. The findings confirm that acculturation is closely related to language use (Hammer, 2017; Lindner et al., 2020; Phinney & Flores, 2002; Zane & Mak, 2003). They are also in accordance with previous research on the interlocutor-specific influences of language interaction: use of the SL among siblings is particularly supportive of SL development (Paradis et al., 2021; Sorenson Duncan & Paradis, 2020; Tsivivits & Unsworth, 2021), while use of the HL with parents is supportive of HL outcomes (Daskalaki et al., 2020; Flores et al., 2017; Hammer et al., 2012; Jia & Paradis, 2020; Place & Hoff, 2016). However, such mediated associations have not been addressed in previous research and provide new evidence on the mechanism of how acculturation influences bilingual development.

All mediated paths detected in the present study were negative (*i.e.*, heritage acculturation influenced SL outcomes negatively, and host acculturation influenced HL outcomes negatively). This suggests a trade-off effect between the two cultures and two languages at this stage of bilingual development. Such results should be interpreted cautiously, especially how the heritage acculturation influenced SL outcomes. Although the enjoyment of HL activities was negatively associated with SL outcomes, this does not suggest that refugee families should discourage their children's enjoyment of HL activities. Migrant children's SL development is supported by a variety of sources, including and beyond the factors captured in the current study. For example, the current study found a strong, positive influence of SL-rich activities on SL outcomes, and previous research has also shown the supportive influences of sibling SL interaction (Paradis et al., 2021; Sorenson Duncan & Paradis, 2020; Tsiniyits & Unsworth, 2021) and cumulative SL exposure at school and in the community (Chondrogianni & Marinis, 2011; Hammer et al., 2012; Paradis & Jia, 2017; Pham & Tipton, 2018; Soto-Corominas et al., 2020). Therefore, there is solid evidence suggesting refugee children's SL will continue to develop as they reside in the host country. On the contrary, it takes more proactive effort to maintain the HL, as migrant children's access to HL is often more restricted (Paradis, 2023), and factors such as the siblings' increased SL use influence the HL negatively (Altman et al., 2014; Rojas et al., 2016). Although the HL seemed to be protected in the present study, possibly related to the refugee children's late arrival and shared language experiences among siblings (especially during the pandemic, Sheng et al., 2021; Sun et al., 2023), evidence shows that HL attrition happens in first-generation immigrants (Yilmaz & Schmid, 2018). As the length of residence increases, refugee children's HL is likely to present with increased variation and require more supportive resources. Compared to the mediated, small negative effect of HL enjoyment on SL outcomes, the former was found to have a direct, strong positive effect on HL outcomes in the present study. Therefore, parents of refugee families should continue to promote their children's enjoyment of HL activities and encourage their children to engage in media and social activities and sibling interactions in the HL. Furthermore, as aforementioned, the Syrian refugee children were in the process of developing a balanced biculturalism. This provides a foundation to develop a strong and balanced bilingual environment (Lindner et al., 2020; Zane & Mak, 2003), where children engage in a high density of activities in both of their languages, which may mediate the acculturation-outcome paths in a positive manner (Paradis, 2023). Therefore, parents and teachers should provide opportunities for refugee children to engage in SL-rich and HL-rich activities, especially HL literacy activities, which have been shown to be supportive of HL development in the present study and previous research (Paradis et al., 2020; Soto-Corominas et al., 2022).

Influences of socioemotional well-being

The SEM results reveal that well-being difficulties made strong negative contributions to bilingual outcomes in both the SL and HL, as anticipated in the DAG (Figure 1) and Hypothesis (2). The finding for the SL is in line with existing evidence among the same cohort 3 years post resettlement (Paradis et al., 2022) and

among younger (preschool-aged) second- or third-generation Latino immigrant children who lived in poverty (Winsler et al., 2014). It indicates that 4.5 years post resettlement, the refugee children were still challenged by well-being difficulties, which likely had challenged their cognitive functioning and, in turn, affected their SL learning (Graham et al., 2016; Halle et al., 2014; Paradis, 2023). This reminds educators that, when assessing and supporting refugee children's language development, their socioemotional well-being needs to be taken into account.

Well-being difficulties' negative influence on HL narrative skills again suggests a potential linkage between well-being and cognitive functioning, since the narrative task in the present study was decontextualized and open-ended, and therefore cognitively demanding. Furthermore, it should be acknowledged that the comprehension stories were presented in MSA (the standardized variety) of Arabic, which might have increased the cognitive demand. On the other hand, no association was detected between well-being difficulties and the HL skills on tasks requiring minimal responses and, therefore, a less demanding cognitive load, *e.g.*, vocabulary, grammar, and word reading tasks. This suggests that it was a strength of late-arrival migrant children to maintain their HL skills despite the well-being difficulties. Furthermore, well-being difficulties were found to be associated with increased engagement in media and social activities in the HL. It is unsurprising that refugee children turned to their familiar social communication scenarios when faced with well-being challenges, which hints at the benefit of promoting HL interaction and heritage culture engagement to improve well-being (Berry, 2005; Sheikh & Anderson, 2018).

We explored whether there was an association between acculturation and socioemotional well-being (Figure 1 and Hypothesis [4]) according to theories and previous research (Berry, 2005; Berry & Hou, 2017; Sheikh & Anderson, 2018). However, the present study did not find such an association. Such a result suggests that for refugee children, their well-being difficulties, as measured by problem behaviors, were not related to their cultural identity. Instead, the well-being difficulties among refugee children might be more related to their experiences of adversity prior to and post resettlement (Hadfield et al., 2017; Kaplan et al., 2016). On the other hand, ethnic identity might be more related to social cognition (the child's understanding of how they are related to others), which is a distinctive dimension of socioemotional development compared to problem behaviors (Halle et al., 2014).

Limitations and conclusions

A limitation of the present study is that the socioemotional development factors, language environment factors, and language outcomes were measured concurrently. Thus, although the study aimed to understand the directionality among ID factors based on research evidence and theoretical frameworks (Paradis, 2023), the measures did not follow a temporal ordering (*i.e.*, variables on the left of the DAG were not measured earlier in time than those on the right), and any causal interpretation should be made with caution (De Cat & Unsworth, 2023). Another limitation is that socioemotional well-being was indexed by problem and prosocial

behaviors, while the operational definitions of well-being can be various and multidimensional (Kern et al., 2015; Northfield et al., 2024). Therefore, future research should consider including more comprehensive measures for refugee children's socioemotional well-being.

This study is the first, to our knowledge, to explore the directionality and mediation between socioemotional development, language environment, and bilingual outcomes among refugee children—a vulnerable group of children who experienced adversity and arrived in the host country at various ages, therefore subjected to challenges in acculturation and well-being. After resettling in Canada for 4.5 years, the refugee children were able to develop an integration orientation to acculturation, but they were still faced with long-lasting and possibly increasing well-being difficulties. The integration orientation of acculturation, especially the maintenance of a strong heritage cultural and linguistic identity, was overall beneficial for refugee children's bilingual outcomes, while the well-being difficulties influenced their bilingual outcomes, especially SL learning outcomes, negatively. To promote refugee children's socioemotional development and bilingual development, educators and practitioners are recommended to (1) promote children's heritage-cultural identity and engagement in meaningful HL activities, (2) provide long-term support for children's socioemotional well-being, and (3) consider the complex sources of difficulties when evaluating refugee children's language and academic outcomes. It needs to be acknowledged that the findings on acculturation in this study were situated in a multicultural context in Canada, where heritage cultures are highly valued in policies and in society (Government of Canada, 2024). Future studies in a variety of host countries with different social values will bring further insights into the relationships between socioemotional development and bilingual outcomes.

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