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Bilingualism in children with developmental disorders: A narrative review

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ABSTRACT

Children with developmental disabilities (DD) often need and sometimes opt to become bilingual. The context for bilingual acquisition varies considerably and can impact outcomes. In this first article of the special issue, we review research on the timing and amount of bilingual exposure and outcomes of either direct language intervention or educational placements in three groups of children with DD: Specific Language Impairment (SLI), Autism Spectrum Disorders (ASD), and Down syndrome (DS). Children with SLI have been studied more than the other two groups. Findings showed that, on the one hand, the communication skills of simultaneous bilinguals and matched monolinguals with DD were similar for all groups when the stronger language or both languages of the bilingual children were considered. On the other hand, similar to typically developing children, sequential bilinguals and matched monolinguals with SLI (other groups not studied) differed on some but not all second language (L2) measures; even after an extended period of exposure, differences in L2 outcomes were not completely resolved. There is emerging evidence that the typological similarity of the languages being learned influences L2 development in sequential bilinguals, at least in children with SLI. Increasing the frequency of exposure seems to be more related to development of the weaker language in bilinguals with DD than their stronger language. Language intervention studies show the efficacy of interventions but provide little evidence for transfer across languages. In addition, only one (unpublished) study has compared the language and academic outcomes of children with DD in different language education programs. Research on bilingual children with DD in different educational settings/programs is limited, probably as a result of restricted inclusion of these children in some educational settings. We argue for the implementation of full inclusion policies that provide increased access to dual language programs for children with DD and access to a complete range of support services.

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1. Introduction

Access and participation in bilingual opportunities for children with developmental disabilities (DD)[1] are the focus of this special issue. Bilingualism is often a necessity, sometimes a choice and, in countries such as Canada where there are two official languages, also a right. But do all children have equal access to opportunities to become bilingual and, in particular, to participate to the same degree in educational programs and services for bilinguals? A recent brief by the Canadian Research Institute for Social Policy says no, at least not in French immersion programs in New Brunswick, Canada (Willms, 2008). Girls, children in families with higher incomes, and typically developing children have disproportionately higher enrolments than children outside these categories. Children with DD have less access to French Immersion in this community, and likely to other bilingual opportunities. Likewise, access and participation are likely restricted in many communities, not just New Brunswick. The research reported in this special issue was conducted to examine issues of access and participation in opportunities for bilingualism among children with DD, hereafter referred to as "bilingual access and participation". It was carried out by an international group of researchers and partners located in six cities (Halifax, Montreal, Vancouver, Albuquerque, Manchester, Nijmegen) in four countries (Canada, the United States, the United Kingdom, the Netherlands) and two continents (North America, Europe). The six sites allowed examination of both intra- and inter-national variability in bilingual access and participation.

We chose a four-pronged approach to studying bilingual access and participation within and across sites: a narrative literature review (this paper), a review of policies and practices in each site (Pesco et al., this issue), a qualitative analysis of key informant interviews with policy makers, administrators and practitioners (de Valenzuela et al., this issue), and a quantitative analysis of survey data provided by administrators and practitioners (Marinova-Todd et al., this issue). The findings from each area of inquiry are presented in this special issue and used to propose a framework for identifying factors that either positively or negatively affect a child with DD in their "journey towards lasting bilingualism" (p. 20) (Kay-Raining Bird, Trudeau and Sutton, this issue), illustrated through the use of case studies.

The present literature review focuses on two areas of bilingual development: a) the timing and amount of bilingual exposure, and b) outcomes from either direct language intervention or language-in-education placements. Specifically, we ask:

1. Does the course of development differ for simultaneous and sequential bilinguals with DD and how does the amount of exposure to each language influence development?
2. What do we know about how direct language intervention or schooling in different languages influences children with DD?

Bilingualism is a multidimensional and dynamic construct which has been defined in numerous ways. For the purposes of this review, we favor Grosjean's, 1992 definition: "the regular use of two (or more) languages". Grosjean states that bilinguals are "those people who need and use two (or more) languages in their everyday lives" (p. 51). By emphasizing language use rather than language proficiency, Grosjean's definition is appropriate for bilingual children with DD who may never completely acquire any language but still need to use two languages to function fully and effectively in their day-to-day lives. Terms specific to bilingualism and used throughout this review are defined in Table 1.

Issues of timing and amount of bilingual exposure, intervention and language-in-education outcomes are of critical concern in determining how best to facilitate bilingual development in children with DD and identify appropriate avenues for access and participation. While considerable research has addressed bilingual development and educational outcomes for typically developing (TD) bilingual children, less information is available for bilingual children with DD (Kohnert & Medina, 2009). We focus upon three groups of bilingual children with DD: children with Specific Language Impairment (SLI), Autism Spectrum Disorders (ASD), and Down syndrome (DS). These three groups are of interest because all have disorders of language and/or social interaction, and there is a reasonable body of research on these learners. SLI refers to the presence of a language impairment in the absence of impairments in nonverbal intelligence, frank neurological difficulties, hearing problems, and oral-motor structure and function difficulties (e.g., Leonard, 2014). We treat SLI as synonymous with Language Impairment, Developmental Language Disorders, and Primary Language Impairment. ASD is a disorder of social interactions accompanied by restricted repetitive behaviors and often but not always associated with intellectual disability (ID) and/or language impairments (e.g., De Villiers, Szatmari, & Yang, 2014). DS is a chromosomal disorder usually resulting in moderate ID, language impairment, and physiological, anatomical and health anomalies (e.g., Chapman & Kay-Raining Bird, 2011; Fidler, Most, & Philofsky, 2008). We also present three cases that illustrate the variability in experiences of bilingual children with DD in Kay-Raining Bird, Trudeau, & Sutton (this issue).

In this article, we review recent literature on bilingual development and outcomes for children with SLI, ASD, or DS. This is a narrative review; therefore, a strict methodology for the identification and analysis of studies was not followed. The first author searched databases and reference lists of studies (e.g., Google Scholar, PsycInfo, ERIC) to identify work

[1] In the special issue we define developmental disabilities somewhat unconventionally to include all children with language and/or intellectual disabilities. Thus, children with specific language impairment are included in our definition.

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Table 1
Terminology.

Term	Definition
Majority language	Languages highly valued in society. Spoken by a majority of people in a society, including the power elite. Predominate in mass media and public institutions.
Minority language	Less valued by society. Spoken by fewer people. Not present or less evident in the media and public institutions.
Official language	Designated by law as the language of the society.
Simultaneous bilingual	Both languages learned from birth or soon after.
Sequential bilingual	Exposure to a second language (L2) after a considerable period of exposure to the first language (L1). There is no single agreed-upon age at which this transition is thought to occur, although researchers often use 3 years of age.
L1 and L2	L1 refers to the first language learned by a sequential bilingual. L2 refers to the second language learned.
Balanced bilinguals	Proficiency in both languages is about equal.
Dominant or stronger language	The language in which a bilingual is more proficient. This may be hard to determine as languages are often used for different purposes by bilinguals and a person may be able to discuss different topics more proficiently in different languages. The weaker language, in contrast is the less proficient language of a bilingual.
Additive bilingualism	A bilingual context in which a bilingual child develops a second language at no cost to the first.
Subtractive bilingualism	A bilingual context in which the L1 proficiency is negatively impacted by exposure to the L2.
Typological similarity	Degree that two languages share lexical, phonological, morphological, and grammatical features.
Lexical cognates	Words in two languages that share structural and semantic characteristics (e.g., "piano" in French and English)
Language-in-education	An all-encompassing term for educational programs in which a child learns a language other than that spoken at home. Includes dual language programs, language classes taught as a subject, and programs taught in the majority language accessed by minority L1 speakers.
Dual language programs	Educational programs where instruction is provided in two languages (often the majority language and a minority language). The percentage of instruction in each language can vary from 50:50 to 90:10.

Sources: Baker (2011), Kohnert (2013), and Paradis et ?al. (2011).

published since 2008[2] in English that addressed bilingualism in the three populations. Only studies that directly tested the language and/or cognitive abilities of bilingual children with DD, or assessed these skills via parent report, were included. Bilingualism in children with SLI has been studied more than in the other two populations (Kohnert & Medina, 2009). Therefore, we expanded the search period for studies of bilinguals with DS or ASD in order to obtain a reasonable corpus for scrutiny. On-line supplemental Appendices A, B, and C summarize the identified studies of bilingual children with SLI (33 studies), ASD (14 studies), and DS (5 studies), respectively.

1.1. Bilingual language exposure in typically-developing children

Timing of bilingual exposure impacts bilingual development. With relatively equal exposure to both languages, TD simultaneous bilinguals (exposed to both languages before 3 years of age) are reported to achieve language milestones at roughly similar ages as monolingual children and demonstrate differentiated and language-appropriate morpho-syntactic development (see De Houwer, 2009; Paradis, Genesee, & Crago, 2011; for reviews). TD sequential bilinguals, exposed to a second language after three years, require time for their L2 abilities to catch up to those of same-age monolingual peers acquiring the same languages; and, in fact, they may never achieve parity with monolingual native speakers (Abrahamsson & Hyltenstam, 2009). According to Cummins (2008), with consistent and intense exposure, TD sequential bilingual children require approximately two years for their functional conversational skills in the L2 to reach the same levels achieved by same-age monolingual peers and five to seven years for their academic language abilities to be comparable (see also Genesee & Lindholm-Leary, 2012). L2 learners tend to achieve higher levels of proficiency in their L2 if they are exposed earlier in childhood rather than later or in adulthood (Baker, 2011). However, age effects are, in part, attributable to differences in the length of time and the amount and quality of L2 exposure in younger versus older L2 learners (Marinova-Todd, Marshall, & Snow, 2000). Further, earlier exposure is not always beneficial when L2 learning takes place primarily in school settings (e.g., Genesee, 2014; Muñoz, 2014).

Amount of exposure to each language also impacts the development of TD bilingual children. Several metrics of amount of exposure have been used, such as the percentage of time a child is currently exposed to or using each language, the percentage of life-time exposure to or use of each language, or the amount of time since first exposure to the second language (L2) in sequential bilinguals (Bedore, Peña, Griffin, & Hixon, 2016; Bedore et al., 2012). Thordardottir (2011, 2014) studied the impact of lifetime exposure on the bilingual development of TD French-English simultaneous bilingual preschoolers in Montreal and found it strongly impacted vocabulary and morphosyntax development. Specifically, the receptive vocabulary and expressive and receptive morphosyntax skills of bilingual and monolingual children were comparable in a given language as long as the bilinguals had 40–60% lifetime exposure to both languages. Bedore et al. (2012) reported similar findings for Spanish-English sequential TD bilingual preschoolers and kindergarteners, using a combined measure of current exposure and use. Further, they found that the combined measure was a better predictor of language dominance in their

[2] 2008 was chosen so as to extend the work beyond that reviewed by Kohnert and Medina (2009). One unpublished dissertation by Myers (2009) was included, which examined issues not addressed in the published literature.

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bilingual children than time from first exposure (Bedore et al., 2012). Bedore et al. (2016) reported a more complicated picture of relationships between measures of exposure and Spanish-L1 and English-L2 proficiency in their study of sequential bilinguals in first and third grades. They found that both measures were highly correlated in first graders and both predicted English proficiency equally. However, by third grade the impact of these variables interacted such that current English exposure/use was most strongly correlated with English proficiency in children exposed to English at later ages. When Spanish (the L1) was considered, proficiency at both grade levels was highest for children who were currently exposed to and used Spanish most of the time and were first exposed to English at earlier ages. Indeed, Spanish proficiency was described as "suppressed or neglected" (p. 702) in children recently exposed to English, even when Spanish frequency of exposure/use was high. Finally, Spanish but not English proficiency was better predicted by frequency of exposure and use than age of first exposure to English.

Hammer, Lawrence, and Miccio (2008) and others (e.g., Oller & Eilers, 2002) have shown that, on the one hand, sequential bilingual children's abilities in a majority L2 can develop to the same levels as those of monolinguals regardless of whether the bilingual children are exposed to the majority language at home or not (see also Genesee & Lindholm-Leary, 2012). Arguably, exposure to the majority language in school and elsewhere in the community compensates for lack of exposure to that language in the home. On the other hand, the minority L1 of sequential bilinguals is often at risk once they are exposed to the majority L2. Hammer et al. (2008), for example, found that Spanish vocabulary abilities improved in preschool Spanish-L1 children attending HeadStart in English in the U.S. over a two year period only if the children were growing up in homes where only Spanish was spoken. However, measures of general Spanish language ability, such as the Preschool Language Scale-3, declined over the two years of the study, regardless of the language used in the home, probably reflecting the influence of English on these children's exposure to and acquisition of that language.

In the following sections, we review similar issues of exposure amount and timing in children with SLI, ASD, and DS. Each group is considered separately before addressing similarities and differences across groups.

2. Timing and amount of exposure in bilingual children with developmental disabilities

2.1. Timing and amount of exposure in bilinguals with SLI

The developmental studies in Appendix A in Supplementary material compared bilingual children with SLI to one or more comparison groups, matched on age: bilingual TD children, monolingual TD children, and monolingual children with SLI. Bilingual groups were also matched on bilingual characteristics. Age of participants ranged from 3;5 (years; months) to 11;10, with the majority of studies investigating preschool or early school-aged children.

2.1.1. Simultaneous bilinguals with SLI

Simultaneous bilinguals with SLI have been studied far less often than sequential bilinguals with SLI. While limited in number, studies of simultaneous bilinguals with SLI, not surprisingly, show that they exhibit language impairments relative to TD controls. Specifically, Gutiérrez-Clellen, Simon-Cereijido, & Wagner, 2008 found English verb morphology deficits in English dominant simultaneous bilinguals with SLI when compared to TD bilinguals and monolinguals. Similarly, Sanz-Torrent, Serrat, Andreu, & Serra, 2008 reported Catalan-Spanish simultaneous bilinguals with SLI made more verb errors and exhibited a somewhat different pattern of verb morphology development than bilingual TD controls. On the other hand, simultaneous bilinguals with SLI who were exposed extensively and consistently to both languages from birth performed comparably or even better than monolinguals with SLI on measures of morphosyntax when tested in both of their languages (Paradis, Crago, & Genesee, 2006; Paradis, Crago, Genesee, & Rice, 2003) or in only their dominant language (Gutiérrez-Clellen et al., 2008).

2.1.2. Sequential bilinguals with SLI

Again not surprisingly, when compared to same-age monolingual or bilingual TD peers, sequential bilingual children with SLI have identifiable language impairments. These deficits have been evident when the sequential bilingual children with SLI are tested in the majority L2 (Blom & Paradis, 2013; Paradis, Schneider, & Duncan, 2013; Rezzonico et al., 2015; Verhoeven, Steenge, & van Balkom, 2011; Verhoeven, Steenge, van Weerdenburg, & van Balkom, 2011), in their dominant language (Aguilar-Mediavilla, Buil-Legaz, Pérez-Castelló, Rigo-Carratalà, & Adrover-Roig, 2014; Morgan, Restrepo, & Auza, 2013; Rothweiler, Chilla, & Babur, 2010), or in both languages (Girbau & Schwartz, 2008; Iluz-Cohen & Walters, 2012; Sheng, Peña, Bedore, & Fiestas, 2012). Deficits are also found regardless of which specific languages are examined, which language outcome measures are used (with the possible exception of narrative macrostructure after 2 years of exposure; Cleave, Girolametto, Chen, & Johnson, 2010; Iluz-Cohen & Walters, 2012), and which ages are studied (4–10 years).

None of the studies we reviewed compared the L1 abilities of sequential bilinguals with SLI to affected monolingual controls. However, sequential bilinguals with SLI who speak a minority L1 have been reported to perform more poorly on some L2 outcome measures compared to monolinguals with SLI. Specifically, it has been found consistently that sequential bilinguals with SLI perform more poorly on standardized tests of L2 ability than monolinguals with SLI (Cleave et al., 2010; Verhoeven, Steenge, van Weerdenburg et al., 2011; Rezzonico et al., 2015) but demonstrate equivalent abilites to monolinguals with SLI on measures of narrative macrostructure (Cleave et al., 2010; Rezzonico et al., 2015; Tsimpli, Peristeri, & Andreou, 2016). In contrast, lower L2 performance on measures of morphosyntax in sequential bilinguals with SLI

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compared to monolinguals with SLI has been found in some studies (Orgassa & Weerman, 2008; Rezzonico et al., 2015; Tsimpli et al., 2016; Verhoeven, Steenge, & van Balkom, 2011) but not others (Cleave et al., 2010; Rothweiler, Chilla, & Clausen, 2012).

When sequential bilinguals with SLI exhibit poorer performance in the L2 relative to affected monolinguals, this is likely because they have had a limited period of exposure to the L2 and it is consequently their weaker language. A question of interest, then, is how long must a sequential bilingual child with SLI be exposed to the L2 before these differences are no longer evident? As would be expected, preschool-age L2 learners with SLI with one to two years of L2 exposure perform more poorly on most L2 measures than monolinguals (Cleave et al., 2010; Rezzonico et al., 2015). Less expected, studies have shown that sequential bilinguals perform more poorly than their monolingual affected peers even at 10–11 years of age after 5–6 years of L2 exposure (Verhoeven, Steenge, & van Balkom, 2011; Verhoeven, Steenge, van Weerdenburg et al., 2011; Verhoeven, Steenge, & van Balkom, 2012). These latter studies suggest that an extended period of time is needed for sequential bilingual children with SLI to 'catch-up' in their L2 skills to their monolingual affected peers. Further, Verhoeven et al. (2012) demonstrated in a cross-sectional study of 6- to 11-year-old Turkish-Dutch sequential bilinguals, that Turkish, the L1, was more advanced than Dutch, the L2, even in the oldest group of children who had been exposed to Dutch for 5–6 years through Dutch instruction in the schools. It would appear that sequential bilinguals with SLI may need even more time than TD sequential bilinguals (i.e., Cummins, 2008) for their performance in the L2 to catch up to affected monolinguals.

Positive cross-linguistic transfer has been found to facilitate the acquisition of L2. Blom and Paradis (2013) studied the L2 (English) morphological abilities of sequential bilinguals with a variety of L1 backgrounds. They divided participants into groups based on whether their L1s were tense-marking languages (i.e., more similar to English—French for example) or not (dissimilar to English—Mandarin Chinese for example). Greater typological similarity of L1 positively predicted English-L2 tense marking ability indicating positive transfer of morphological knowledge in these 5- and 6-year-olds with SLI. L1 knowledge may positively support L2 acquisition even when the two languages of the bilingual children with SLI were linguistically quite dissimilar. Specifically, Verhoeven et al. (2012) reported that a composite Turkish-L1 language score positively predicted Dutch-L2 language abilities in sequential bilinguals with SLI, even after age, short term memory and performance IQ scores were factored out. In contrast, Girbau and Schwartz (2008) reported that Spanish-English sequential bilingual children's performance on a Spanish non-word repetition task was correlated with a general measure of Spanish but not English language ability. These findings together suggest that cross-linguistic transfer may go from the L1 to the L2, but not the reverse and not for all measures.

2.1.3. Summary

The review of timing and amount of exposure in bilingual children with SLI has provided several important insights. First, simultaneous bilinguals with SLI who have had intensive and consistent exposure to both languages from birth show similar language abilities to affected monolingual peers. In contrast, sequential bilinguals with SLI often perform more poorly in their L2 than monolinguals with SLI, when compared on standardized language tests and measures of morphosyntax. Poorer performance on measures of this type has been demonstrated even for bilinguals with SLI who have had six years of exposure to the L2 in preschool and school. Findings of poorer performance in the L2 for sequential bilinguals are consistent with TD research showing that a protracted period of exposure to the L2 is needed before bilingual children exhibit levels of competence that are equivalent to those of monolingual peers (e.g., Cummins, 2008). In contrast, no differences between sequential bilinguals with SLI and affected monolinguals in narrative macrostructure measures have been found, even for sequential bilinguals with only one year of exposure to the L2, supporting the claim that macrostructure production may be a cognitively-based ability that is less dependent upon L2 proficiency (e.g., Pearson, 2002; Tsimpli et al., 2016). Of interest as well were findings of a facilitative effect of L1 knowledge on L2 acquisition but not the reverse in sequential bilinguals with SLI. Other factors being equal, positive transfer may reduce the period of time in which language differences are observed in sequential bilinguals relative to monolinguals with SLI, and do so faster when the two languages of a bilingual child are more linguistically similar. We turn now to an examination of exposure in children with ASD.

2.2. Timing and amount of exposure in bilinguals with ASD

Appendix B in Supplementary material provides summaries of qualitative and quantitative studies of bilingual children with ASD. The qualitative studies of bilingual children with ASD point to a discrepancy between the research findings and advice being given to parents (Drysdale, van der Meer, & Kagohara, 2015). Parents in these studies were often told to speak only the majority language to their children or they chose to do so themselves because they feared that exposure to two languages may cause or exacerbate the ASD or they could not access services in their L1 (Jegatheesan, 2011; Kay-Raining Bird, Lamond, & Holden, 2012; Kremer-Sadlik, 2005; Yu, 2013). After ASD diagnosis, some children experienced a rapid reduction in L1 input, even though use of the home language continued in adult–adult and adult-sibling interactions in the family (Fernandez y Garcia, Brelau, Hansen, & Miller, 2012; Yu, 2013). Parents expressed personal loss and sadness (Fernandez y Garcia et al., 2012) if they chose to speak only English to their child with ASD. Some also expressed discomfort and difficulty when speaking a non-native language with their child (Yu, 2013) or said they talked less frequently to their child when they used the majority language because it felt less natural. Some expressed a wish to reintroduce the home language later, once the child had a better grasp of the majority language.

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In the following sections, only quantitative studies are considered. Several research design issues are of note. First, three studies combine simultaneous and sequential bilinguals with ASD into a single group for analysis (Chaidez, Hansen, & Hertz-Picciotto, 2012; Hambly & Fombonne, 2014; Kay-Raining Bird et al., 2012). This may not be justified (see discussion of Hambly & Fombonne, 2012, Section 2.2.1). Second, participant samples partially or fully overlap in several studies (i.e., Hambly & Fombonne, 2012, 2014; Ohashi et al., 2012). These studies analyze data from a large multisite longitudinal study of children with ASD (Pathways to Better Outcomes led by Szatmari, Bryson, & Fombonne). Third, bilinguals with ASD in the developmental studies are compared to either TD monolinguals or monolinguals with ASD and groups are matched for age and sometimes also autism severity (Reetzke, Zoui, Sheng, & Katsos, 2015) or nonverbal IQ (Ohashi et al., 2012; Valicenti-McDermott et al., 2012) and participants in most studies varied considerably on these latter two dimensions. Ages of participants ranged from 2;1 to 8;9.

2.2.1. Simultaneous bilinguals with ASD

Three studies compared the abilities of simultaneous bilinguals with ASD to affected monolinguals in the majority language (Petersen, Marinova-Todd, & Mirenda, 2012; Valicenti-McDermott et al., 2012) or the language used most often in the home of the participant (Ohashi et al., 2012). All three studies found that the simultaneous bilinguals with ASD performed equivalently to age-matched monolinguals with ASD on direct tests of receptive vocabulary (Petersen et al., 2012) and on general measures of expressive and receptive language measured using the *Preschool Language Scale-3* (Zimmerman et al., 1992; used by Ohashi et al., 2012; Petersen et al., 2012) or the *Rossetti Infant-Toddler Language Scale* (Rossetti, 2006; used by Valicenti-McDermott et al., 2012). Petersen et al. (2012) also found that the number of English words produced by the Chinese/English simultaneous bilinguals with ASD they studied was lower than that of English-speaking monolinguals with ASD, but that the bilinguals' total vocabulary (the number of words produced in both languages combined) was significantly higher. This pattern of vocabulary abilities has been reported in the TD bilingual literature also (e.g., Pearson, 2008). These findings highlight the need to test both bilinguals' languages in order to fully appreciate their vocabulary abilities.

2.2.2. Sequential bilinguals with ASD

A single study also compared sequential bilinguals with ASD living in China to same-age monolingual peers with ASD (Reetzke et al., 2015). These authors analyzed the results from two parent report instruments of social interaction skills: the *Social Responsiveness Scale* (Constantino, 2002) and the *Children's Communication Checklist* (Bishop, 2006). The bilingual children with ASD were exposed to two Chinese languages and both the child's languages were considered when completing the parent report instruments. Reetzke et al. (2015) found no group differences between monolingual and bilingual groups on social interaction skills or pragmatic abilities.

Chaidez et al. (2012) studied Hispanic and non-Hispanic mothers of children with ASD. A subset of children in these groups were exposed to two languages. These authors reported lower expressive and receptive language abilities (directly tested using the *Mullens Scales of Early Learning*, Mullen, 1995) in children with ASD "exposed to a second language 25–50% of the time" (p. 393), compared to children who did not have that level of bilingual exposure. It is difficult to interpret these results. While the authors state that children were tested in their "preferred language", it is not clear how this was defined. Kay-Raining Bird et al. (2012) studied a mixed group of simultaneous and sequential bilinguals with ASD using survey data. Parents were asked to rate the language and literacy abilities of children with ASD being raised in monolingual or bilingual contexts. Ratings of expressive and receptive language and reading and writing skills in the strongest language (regardless of whether it was their L1 or L2) revealed no differences between bilingual and monolingual children with ASD.

The performance of simultaneous and sequential bilinguals with ASD was directly compared by Hambly and Fombonne (2012). These authors used parent report instruments of social interaction and pragmatics which assessed capabilities in both languages together. They found no group differences except for a measure of interpersonal skills on which the simultaneous bilinguals with ASD outperformed their sequential bilingual counterparts.

2.2.3. Amount of exposure

Two studies have examined the relationship between the amount of language exposure and the language or communication abilities of bilinguals with ASD. Hambly and Fombonne (2014) studied a combined group of 33 simultaneous and sequential bilinguals with ASD exposed to a variety of language combinations. Regression analyses revealed that the current percentage of time that a child was exposed to the L2 (defined as the language spoken to the child less often) in a day accounted for 69% of the variance in their L2 vocabulary size. Hambly and Fombonne (2014) also placed the bilingual children with ASD in three groups based on the number of L2 words they were reported to produce (none, some, or many). Analyses revealed that the group that produced the most L2 words were exposed to the L2 over the last 6 months significantly more often than children in the lower two L2 vocabulary groups. In another study, Reetzke et al. (2015) found no significant correlations between the communication skills of the sequential bilinguals with ASD they studied and the ratio of lifetime exposure to each language. In contrast, correlations between a subscale measuring the child's interest in social interactions and both the age of first exposure and the ratio of recent exposure in each language approached significance. Together, the findings of Reetzke et al. (2015) and Hambly and Fombonne (2014) suggest that measures of current input may be more useful when seeking to understand the relationship between exposure and language and communication skills in bilinguals with ASD than lifetime measures of amount of exposure, although the evidence to date is limited. Hambly and Fombonne (2012) reported an additional interesting finding related to exposure in bilinguals with ASD; the language abilities of both

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simultaneous and sequential bilinguals were lower when mothers reported speaking to their child in a non-native language. This finding may reflect detrimental changes (discussed above in relation to the qualitative studies of bilinguals with ASD) that can result when parents feel they must speak to their child in the majority language even if they are not proficient in that language.

2.2.4. Summary

Despite variability across these studies with respect to participant characteristics and assessment measures, results were very consistent. Sequential and simultaneous bilinguals with ASD did not differ from monolingual children with ASD on language or communication ability, measured through parent report or direct testing, with the exception of expressive vocabulary reported in one study (Petersen et al., 2012). In the case of expressive vocabulary, findings are similar to those reported for TD bilingual children (e.g., Pearson, 2002); total vocabulary is a better reflection of the vocabulary skills of bilingual children than the abilities in each language separately. In addition, similar to findings for TD bilingual children (e.g., Bedore et al., 2012), the current amount of time a bilingual child with ASD is exposed to a particular language is positively related to their level of vocabulary and pragmatic abilities in that language, while lifetime measures of exposure are not.

2.3. Timing and amount of exposure in bilinguals with DS

We now turn to the studies of bilingualism in individuals with DS (Appendix C in Supplementary material). Only five studies have been published, outside of several early case studies (Papagno & Vallar, 1995; Vallar & Papagno, 1993; Woll & Grove, 1996). Four were conducted by the same group of researchers and their participant samples overlap somewhat (Cleave, Kay-Raining Bird, Trudeau, & Sutton, 2014; Feltmate & Kay-Raining Bird, 2008; Kay-Raining Bird et al., 2005; Trudeau et al., 2011). In the summarized studies, bilinguals with DS were compared to monolinguals with DS and/or TD monolinguals and bilinguals. Participants were matched on nonverbal mental age (NVMA). Consequently, individuals with DS are considerably older than their TD controls in these studies. Sample sizes tend to be small due to difficulty recruiting bilinguals with DS, even in bilingual communities (Kay-Raining Bird et al., 2005). Ages of bilinguals with DS ranged from 4 to 19 years; NVMA ranged from 2;2 to 6;2.

2.3.1. Simultaneous bilinguals with DS

Four of the five studies involved simultaneous French/English bilinguals with DS living in Montreal. Two studies compared simultaneous bilinguals with DS to TD monolingual and bilingual controls at a group level (Cleave et al., 2014; Kay-Raining Bird et al., 2005). These two studies showed that simultaneous bilinguals with DS expressive language deficits relative to their mental age in the majority language, English, which was their dominant language (Kay-Raining Bird et al., 2005). Nonetheless, simultaneous bilinguals with DS exhibited the same ability to learn novel words as their TD peers (Cleave et al., 2014). Feltmate and Kay-Raining Bird (2008) provided a detailed analysis of multiple measures of semantics and morphosyntax in four simultaneous French/English bilinguals with DS matched individually to English monolinguals with DS and French-English TD bilinguals. Comparisons within the triads showed, as expected, that the simultaneous bilingual children with DS performed more poorly than the matched TD bilingual children on measures of English and French expressive language, particularly morphosyntax. This suggests that the general pattern of language strengths and weaknesses observed in monolinguals with DS is present in both languages of a simultaneous bilingual child with DS. All four studies cited above compared majority language skills in simultaneous bilinguals with DS and affected monolinguals and found no group differences.

Trudeau et al. (2011) studied mostly simultaneous French-English bilinguals with DS, dominant in English, over a three year period. Mental ages ranged from 2 to 6 years at the onset of the study. Vocabulary in both languages was measured using parent report instruments. Cross-sectional and longitudinal analyses of expressive and receptive vocabulary showed improvement in both languages with age, although English vocabulary skills developed more rapidly than French. More children made gains over time in English than in French. Of interest, the amount of exposure to English at the onset of the longitudinal study was significantly and negatively correlated with gains in the weaker language (French), but not correlated with gains in the stronger language (English). This finding suggests the impact of amount of exposure in a language asymptotes over time. It also suggests that it is of critical importance to ensure a high amount of exposure to the weaker language for growth to take place.

2.3.2. Sequential bilinguals with DS

The abilities of sequential bilinguals with DS have been investigated in a single study (Edgin, Kumar, Spano, & Nadel, 2011) that included Spanish-English bilinguals; they were tested in English, the majority language which was their L2. They were matched on nonverbal IQ to a group of monolinguals with DS and the groups were compared on a battery of neuropsychological tests that included measures of language and cognition. No differences were found between bilinguals and monolinguals with DS on any measure of language, cognition, or adaptive functioning in any study. This suggests that the L2 language of sequential bilingual children with DS is not disadvantaged by bilingualism when it is a majority language. However, it is surprising that no L2 language differences relative to monolingual controls emerged on any language task for these sequential bilinguals with DS. These sequential bilinguals with DS ranged in age from 7 to 18 years. If they were first exposed to English in school, then at least a subset of these individuals would have had a limited period of L2 exposure, a

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possibility the authors did not investigate. Further, L1 skills were not measured. Consequently it is not possible to determine whether English was the dominant language for these sequential bilinguals.

It is interesting to note that the test battery Edgin et al. (2011) used included measures of executive function which are often found to be impaired in monolinguals with DS (Daunhauer, Fidler, & Will, 2014) but relatively advanced in TD bilinguals. Edgin et al. found no executive function differences, but also no advantages for these sequential bilinguals with DS, relative to monolinguals with DS. Perhaps, executive function advantages do not exist in sequential bilinguals with DS. Alternatively, advantages may have been evident if the relationship between duration of exposure and executive function performance had been analyzed, which was not done.

2.3.3. Summary

The limited evidence at hand suggests that simultaneous and sequential bilinguals with DS are not disadvantaged by bilingual exposure. They consistently perform comparably to monolingual peers with DS, at least in the majority language. Further, there is clear evidence for a similar profile of language strengths and weaknesses in monolinguals and simultaneous bilinguals with DS. Finally, input frequency may be an important determinant of growth for the weaker language of bilingual children with DS. In addition, future studies should include analyses of language exposure when seeking to understand L2 abilities in sequential bilinguals with DS and to determine if there are bilingual advantages. Clearly, additional studies are needed to augment the existing evidence.

2.4. Summary: timing and amount of exposure in three groups of children with DD

Across groups, several general conclusions can be drawn. With respect to exposure, when compared to TD controls, bilinguals in all three groups exhibit predictable communication difficulties. These difficulties have been more explicitly studied in bilinguals with SLI and DS and in both cases patterns mirror those reported for monolinguals with the same disorder. When the performance of bilinguals and monolinguals with the same disorder was directly compared, simultaneous bilinguals in all three DD groups perform equivalently or better than the monolingual controls. The same was found for sequential bilinguals when tested in their dominant language or when both languages were taken into account. However, the L2 performance of sequential bilinguals with SLI has often, but not always, been found to be poorer than that of monolinguals with SLI —although these differences probably reflect the fact that the bilingual children with SLI were tested in their weaker language. However, this is unclear insofar as these studies usually failed to report language dominance or provide parallel measures of abilities in both languages. L2 performance in sequential bilinguals with SLI remains behind monolingual affected peers on many measures, even after five or more years of exposure to the L2. Finally, current frequency of input seems to be an important predictor of language development in children with DD, but not necessarily in the stronger language. Thus, attention should be paid to ensure adequate amounts of language exposure in the weaker language of bilinguals with DD.

3. Language intervention and education outcomes in bilingual children with SLI, ASD, and DS

The second goal of this review was to examine the impact of clinical language interventions and the outcomes of language-in-education programs for bilingual children with DD. Bilingual children with SLI, ASD, and DS are considered together in the sections that follow due to the limited number of studies that have included these populations. Both bodies of work have focused almost exclusively on bilingual children with SLI and not bilingual children with ASD or DS. Clinical language interventions will be discussed first, followed by outcomes of language-in-education programs.

3.1. The efficacy of language interventions for bilingual children with DD

In 2010, Thordardottir reviewed seven language intervention studies involving bilingual children with, or suspected of having, SLI. She reported that the studies were of questionable quality but concluded that there was some support for the positive effects of intervention in L1 on L1, intervention in L2 on L2, and bilingual intervention on both languages. Further, intervention in L1 appeared to have a facilitative effect on L2 development, although the conditions for this effect needed to be studied further. Since her review, several high quality randomized controlled trials have been published (see Appendix A in Supplementary material), all involving sequential bilingual children with SLI (Ebert, Kohnert, Pham, Disher, & Payesteh, 2014; Pham, Ebert, & Kohnert, 2015; Restrepo, Morgan, & Thompson, 2013; Thordardottir, Cloutier, Menard, Pelland-Blais, & Rvachew, 2015). Each study is described briefly below.

Ebert et al. (2014) studied bilingual elementary school children with SLI. They compared pre- and post-therapy performance on expressive and receptive vocabulary and general language measures in four language intervention conditions: English only (the L2), 80% Spanish (L1), nonverbal cognitive training, and no treatment. Treatment involved 75 min sessions, 4 times per week, for 6 weeks. Restrepo et al. (2013) included four treatment conditions: two were bilingual interventions, conducted half in English and half in Spanish and with either vocabulary or math as therapy targets. The other two interventions were conducted in English (L2) and also targeted vocabulary or math. They measured expressive and receptive conceptual vocabulary changes at baseline and immediately post-intervention as well as 8 months later. Therapy was for 45 min per day, 4 days per week for 12 weeks. Tsybina and Eriks-Brophy (2010) studied children suspected of having a

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language impairment. A therapist conducted dialogic reading sessions in English (L2) and the parent did the same intervention in Spanish (L1). Thirty 15-min sessions were completed in each language and targeted vocabulary knowledge was measured pre-, post- and 6 weeks follow-up. Finally, Thordardottir et al. (2015) studied three treatment conditions: language intervention in French (L2), bilingual language intervention in which the clinician treated in French (L2) and the parent treated in various L1s, and a no-treatment condition. One 50-min session per week was held for 16 weeks. They examined standardized expressive and receptive vocabulary, non-word and sentence repetition tasks, and language sample measures at pre-, post-, and 2 months follow-up.

Analyses of pre-test to post-test gains in these studies consistently showed that monolingual interventions in the majority L2 improved the L2 but did not benefit the untreated minority L1, while bilingual interventions positively impacted both languages in the Ebert et al. (2014) study but only the L2 in the study by Thordardottir et al. (2015). The monolingual interventions were always in the majority (L2) language; no studies have investigated the impact of treatment in the minority-L1 alone and whether this would impact majority-L2 learning. The intervention study by Ebert et al. (2014) suggests this might be the case as the bilingual intervention condition was actually conducted 80% of the time in Spanish. Results showed progress primarily in Spanish, but also in some English skills. In contrast, the monolingual English intervention had no impact on Spanish skills (Ebert et al., 2014).

Follow-up testing was conducted in four of the studies and revealed that gains achieved in both monolingual and bilingual interventions were maintained for varying periods of time following completion of the interventions (Pham et al., 2015; Restrepo et al., 2013; Thordardottir et al., 2015; Tsybina & Eriks-Brophy, 2010). However, continued improvements were evident only for L2 treatment conditions (Pham et al., 2015; Restrepo et al., 2013). Interestingly, only Pham et al. reported the language of instruction (LOI) in the schools of the children being studied. In this case, children were educated only in English (Pham et al., 2015). Therefore, it is possible that continued gains observed in L2 interventions are confounded by the LoI of the children being studied.

Gutiérrez-Clellen and colleagues investigated the efficacy of a program that was a hybrid between a language intervention study and language-in-education research (Gutiérrez-Clellen, Simon-Cereijido, & Sweet, 2012; Simon-Cereijido, Gutiérrez-Clellen, & Sweet, 2013; Simon-Cereijido and Gutiérrez-Clellen, 2014). They explored the impact of an "academic enrichment" program on the Spanish (L1) and English (L2) language abilities of sequential Spanish-English bilingual four-year-olds with SLI who were first exposed to English on preschool entry. The enrichment program was administered either in English or equally in both Spanish and English. The enrichment program was taught by preschool teachers and targeted vocabulary, oral language and numeracy skills within book-reading activities. It was implemented for 45 min, 4 days a week for 12 weeks. The rest of the time, children participated in the regular preschool program which was a bilingual program with about 50% or more Spanish exposure. These researchers found that both enrichment programs led to gains in both languages and gains were also observed in 5-month follow-up testing, although it is difficult to attribute these gains to the intervention alone as the children were attending bilingual preschool programs as well. Gutiérrez-Clellen et al. (2012) reported on predictors of English (L2) gains in the bilingual children with SLI attending the enrichment programs. They found that the dual language program led to greater L2 gains in MLU than the English-only program although gains on other language measures did not differ. Also, Spanish (L1) MLU at baseline predicted English (L2) MLU gains, suggesting cross-linguistic facilitation from the stronger to the weaker language. Not surprisingly, baseline measures of L2 vocabulary and the amount of time children used L2 in the preschool classroom predicted L2 language growth for these children. In a companion study, Simon-Cereijido et al. (2013) investigated predictors of Spanish (L1) in the same sequential bilingual children with SLI. They found that children in the dual language program made more L1 gains on a sentence repetition task than children in the English only enrichment program. Also, lower conceptual vocabulary skills at baseline led to steeper Spanish language gains in these sequential bilinguals with SLI while more English use in the regular preschool classroom was a negative predictor of L1 gains.

One case study has explored the effectiveness of treatment done first in Korean (L1) and then English (L2) with a bilingual child with ASD (Seung, Siddiqi, & Elder, 2006). Seung et al. (2006) documented improvement in Korean and English skills in the child and in the mother's feeling of competence, but with no experimental controls it is difficult to attribute the changes to the interventions conducted.

3.1.1. Summary

A number of high-quality intervention studies have been conducted recently on sequential bilinguals with SLI. These studies support the efficacy of monolingual (L2) and bilingual interventions for bilinguals with SLI. Treating L2 has not been shown to positively impact L1 for bilinguals with SLI. Further, it is currently not known what effects treating L1 would have on either L1 or L2 (although presumably treating L1 would positively impact L1). These studies need to be done. Further, treatment effects are likely impacted by the LoI of the children. Future work needs to disentangle LoI, amount of exposure to each language, and language of intervention. High quality intervention studies remain to be done with bilinguals with ASD or DS.

3.2. Language-in-education

It has been widely documented that the type of educational program and, in particular, LoI can influence the outcomes of TD bilingual students from minority home language environments. For example, after Spanish-L1 children enrolled in U.S.

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preschools where English was the LoI, parents increased their use of English-L2 in the home (Hammer, Davison, Lawrence, & Miccio, 2009). With continued instruction in the L2 only, Spanish-L1 acquisition in these TD preschool children plateaued or even declined, although children with less English at home had better Spanish skills than those with more English at home (Hammer, Lawrence, & Miccio, 2008). Similar negative impacts on L1 acquisition resulting from English-only instruction in the U.S. have been documented in school-age children (Oller & Eilers, 2002). In contrast, TD Spanish-L1 children achieve better academic L1 and L2 language outcomes in the U.S. when they attend dual language school programs than when they attend schools where English is the only LoI (e.g., see Genesee & Lindholm-Leary, 2012, for a review; Goldenberg, 2008; Thomas & Collier, 2012). Further, TD English-L1 children from majority language backgrounds in Canada and the U.S. successfully acquire a high degree of fluency in the minority L2 (be it French in Canada or Spanish in the U.S.) when immersed in this language at school, without detrimental effects on their L1 or academic achievement (e.g., see Genesee & Lindholm-Leary, 2013, for a review). Recently, researchers have begun to study the outcomes of TD children from a variety of minority L1 backgrounds living in English majority communities and attending French Immersion programs in Canada (Au-Yeung et al., 2014; Mady, 2015). These studies show that children from a variety of minority language backgrounds attending French immersion programs perform as well as children from majority English-L1 backgrounds also in immersion with respect to French language and academic abilities, plus they acquire the majority language (English), thus becoming trilingual.

We have very little understanding of whether the effects of schooling documented for TD children extend to children with SLI. A single unpublished study conducted in the U.S. has compared the academic outcomes of children with DD when schooled in a two-way immersion program compared to English-only educational programs (Myers, 2009). In two-way immersion programs, instruction is provided in both Spanish and English to children from both minority Spanish-L1 and majority English-L1 backgrounds. Myers examined the performance of children with a variety of developmental disabilities on state-wide tests of academic and English language abilities, but due to small sample sizes for children with intellectual disabilities, Myers was only able to statistically analyze two groups: children with learning disabilities and children with health impairments. She found that the academic and English language abilities of the children with learning disabilities or health impairments were similar to affected students in English-only programs. Myers did not report Spanish language outcomes, which presumably would be stronger for children in the dual language programs.

The success of majority language children with SLI in other dual language programs has similarly rarely been studied. However, Genesee (2007) reviewed research on outcomes for at-risk children in French Immersion programs in Canada. At-risk was defined as children identified as learning disabled, language or reading impaired, or at risk for academic difficulty for non-clinical reasons (e.g., low SES, minority cultural background). He reported that many children who began to experience language or academic difficulties in French Immersion would transfer out. If they stayed, however, their English language and academic performance was found to be similar to that of students with similar backgrounds participating in programs in which English was the only language of instruction. In addition, the students in French Immersion acquired a significantly higher level of French language competence than students in the English program with traditional 'core French' instruction. Of specific interest for our purposes by Bruck (1978a,b, 1982); reviewed by Genesee (2007). Bruck examined the literacy and academic achievement of grade 3 English-L1 students identified as language impaired (SLI) who were enrolled either in French Immersion or English-only programs. She found that students with similar levels of language impairment in the two educational programs performed similarly. In addition, the French language skills of the children with SLI in French Immersion were more advanced than same-age TD children in the English-only program. Genesee (2007) concluded that at-risk children who speak a majority L1 are not at "differentially greater risk" (p. 664) in French Immersion programs.

3.2.1. Summary

Results from the limited number of studies on the outcomes of dual language programs suggest that children with SLI from either majority or minority language backgrounds can be successful in these programs. On the one hand, it seems obvious that dual language and French Immersion programs are more likely to promote bilingualism in sequential bilinguals with DD than programs taught only in the majority language. On the other hand, it is often feared that the development of skills in the majority-L2 will be compromised if minority-L1 children are educated in dual language programs, arguably because of reduced exposure to the majority language in such programs. Research to date does not substantiate these fears although, clearly, much more research is necessary to determine under what educational conditions bilingual children with DD best thrive.

In order to acquire a more complete understanding of the suitability of alternative language programs for children with DD, these children must have access to dual language education and be provided with appropriate special education supports within these programs. The articles reviewed provide little evidence regarding whether children with DD are able to participate in dual language programs. However, other articles in this special issue (Marinova-Todd et al.; de Valenzuela et al.) and Willms (2008) provide clear evidence that children with DD are restricted in their access. When the authors whose studies we reviewed report classroom LoI, it appears that most bilingual participants with DD who have been studied are instructed in the majority language only, although there are exceptions (Girbau & Schwartz, 2008; studies by Gutiérrez-Clellen, Simon-Cereijido and colleagues). Providing access to the full range of language education options will substantially facilitate research on the educational outcomes of bilingual children with DD.

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4. Recommendations

4.1. Policy and practice implications

Based on current knowledge, several policy and practice implications can be drawn. First, despite considerable evidence that children with DD can and do become bilingual, there seems to be a continued need to disseminate current evidence broadly so that professionals and parents are able to make informed decisions and recommendations and children with DD are included in important life contexts.

Second, children with DD become bilingual within the limitations set by their developmental disorder. However, sequential bilinguals with DD may require a prolonged period of exposure to the L2 before they 'catch up' with monolingual-affected peers. This should be taken into account in assessments and during schooling.

Third, not surprisingly, the amount of exposure to each language is important, especially for development of the weaker language of bilingual children with DD, often the minority language. It appears that metrics that quantify current input frequency may be more explanatory than those reflecting life time exposure for children with DD. That being said, there has been no attempt yet to explore the relationship between different metrics and development in the populations studied here. In addition, calculations of the amount of language exposure tend to vary across studies. Nonetheless, parents and professionals should try to identify opportunities for children with DD to functionally use both languages frequently and in enriched ways.

Fourth, the evidence suggests that treatment should support both languages to ensure optimal development in both. Supporting both languages is important for children with DD who need and use both languages in their everyday lives. Thordardottir (2010) provided some useful suggestions on how to support both languages given the many constraints that currently exist in treating children from very diverse backgrounds.

Fifth, evidence from bilingual children with DD would suggest that positive transfer is more likely to occur from the L1 to the L2. However, better understanding of the conditions that engender positive cross-linguistic transfer would provide useful guidance in determining how to treat language disorders in bilingual children in the most efficient way possible.

Finally, current research on the suitability of dual language education for children with DD is limited and we need much more research on this issue. In the meantime, since there is no evidence that justifies policies that exclude children with DD from dual language programs, parents of children with DD should not be discouraged from enrolling their children in these programs if they so desire. Moreover, children with DD in dual language programs should be provided the same array of special education supports that are available to monolingual children in monolingual education programs.

4.2. Future research

This review highlights many gaps in the current research on bilingual children with DD. Most obviously, bilinguals with ASD and DS are understudied and require additional focused research with respect to almost all aspects of development and intervention. The following are suggestions for specific studies to expand our research base.

1. There is a dearth of longitudinal studies of bilingual children with DD of all types with respect to the language development in home and school contexts and the factors that influence their development.
2. Parents, educators and other professionals would benefit from future research that focuses on the language practices of parents with children with DD and on the influence of those practices on their children's language development.
3. In addition, research that provides educational guidance to families and practitioners is sorely needed. At present, there is a dearth of research on bilingual children with SLI, ASD, and DS in various types of dual language programs and, thus, future research that focuses on the outcomes of these children and pedagogical practices that support their learning would be very beneficial.
4. Intervention studies are also greatly needed, including studies that focus on bilinguals with ASD and DS and studies that provide interventions in the L1. Such studies could provide evidence concerning the nature and extent of cross-language transfer.
5. Alternative methods of studying cross-linguistic transfer should be pursued, including collecting samples of a broad range of language combinations in order to better reveal the effects of language distance on bilingual acquisition. Intervention studies of bilinguals with a variety of disorders and studies of the impacts of L1 intervention on L2 outcomes as well as L2 on L1 would go a long way toward improving our understanding of positive transfer.
6. It is of critical importance that comparative research on educational program outcomes be carried out. However, this can only be done if children with DD are enrolled in the full range of educational program options. This review suggests that is not currently the case since most studies that report LoI indicate it is in the majority language.
7. Finally, in light of what appear to be formidable and extensive barriers to access to bilingual opportunities – in school, the community, clinical settings, and elsewhere – there is a serious need for research that directly examines access to bilingual opportunities in various educational settings. In addition, such research should examine the beliefs, attitudes, and values that educators, medical practitioners, and especially developmental specialists have about bilingualism and children with DD so that we are better able to plan and design research that addresses the validity of their concerns and informs their practices. These needs begin to be addressed in the research reported in this special issue.

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This review has also highlighted the need for researchers to systematically provide common information about the bilinguals with DD they study. We recommend the following be provided in any study of bilinguals with DD: languages spoken (or signed), age of first exposure to each, duration of exposure over the lifetime, consistency of exposure (i.e., periods of major change in exposure), frequency of current exposure, proficiency in each language, social status of each language, preschool or school program attended and LoI in each program. Providing this information would greatly assist in comparing results across studies and compiling an accurate understanding of bilingual abilities of children with DD in context.

5. Conclusion

In the increasingly globalized context of the 21st century, the need for and the benefits associated with knowledge of additional languages are increasing. On the one hand, a growing number of parents are actively seeking ways of giving their children the bilingual skills that they perceive will benefit them by providing additional personal and professional opportunities. On the other hand, extensive international migration of people from one language community to another means that the number of individuals and, in particular, children who need skills in more than one language is growing. For these children, bilingualism is not optional – it is a fact of life. There is a virtual flood of all types of research on bilingualism in typically development children from multiple perspectives – linguistic, social, neuro-cognitive, educational, and others. In stark contrast, there is a serious lack of similar research on children with developmental disorders. We cannot ignore these children. If we are to provide timely, appropriate and effective support and intervention for them, we need more research that addresses development from multiple perspectives.

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.jcomdis.2016.07.003.

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