Research & Reviews: Journal of Nursing & Health Sciences

Social and Cognitive Development of the Bilingual Brain: Advantage and Disadvantage

Hana Conlon[1]*, Rita Marie John[1,2]
[1]Columbia University, School of Nursing, 617 West 168th Street, New York, NY 10032, USA
[2]Pediatric Primary Care Nurse Practitioner Program, 617 West 168th Street, New York, NY 10032, USA

Research Article

Received date: 31/12/2015
Accepted date: 04/02/2016
Published date: 11/02/2016

***For Correspondence**

Hana Conlon, Columbia University, School of Nursing, 617 West 168th Street, New York, NY 10032, USA, Tel: 646-734-8904

E-mail: hana.conlon@gmail.com

Keywords: Bilingual advantage, Bilingual disadvantage, Bilingualism, Cognitive processing, Primary care.

ABSTRACT

Bilingual individuals make up a growing part of the United States population. Regardless of controversy on the existence of bilingual advantage vs. disadvantage, the children and families who make up the bilingual patient cohort require special considerations when providing care. Understanding the medical and academic needs of this patient cohort requires an understanding of current available research and policy surrounding this issue. This article discusses unique neuronal make up as well as proposed differences on cognitive processing between bilinguals and monolinguals. Through a review of currently published literature on this topic, this article equips the school nurse with the necessary background to manage the care for these patients as well as provide appropriate anticipatory guidance in an ever-changing environment.

INTRODUCTION

Public opinion in recent years has been decidedly skewed towards the acknowledgment of the many benefits and advantages that being bilingual can bestow on an individual. Claims range from evidence that bilingual children have improved executive function and impulse control, to suggestions that bilingualism may benefit prematurely born infants by strengthening otherwise compromised neural connections [1-3]. The plethora of research and overwhelming trend of positive results repeatedly reinforces what has begun to be taken as truth about bilingualism but it is important to consider all evidence before coming to definitive conclusions.

OVERVIEW

DeBruin et al. suggested that the media attention and public belief about the bilingual advantage's dramatic effect are not warranted, and are based on an augmented results due to publication bias [4]. This bias, not only the fault of journal editors, is the sum of many decisions made in the publication process, starting with lack of negative result publication or the decision to only publish the portion of research that supports previously published findings. The imbalance is exacerbated by journals accepting positive results with fewer revisions as opposed to negative results, which often require major revision or are rejected entirely (68% vs 29% publication rate respectively).

Statistics support the existence of publication bias but there is also no evidence that bilingualism is detrimental, and the advantages of enhanced executive function exhibited by bilinguals have not been disproven [5,6]. Thus the importance of the bilingualism topic remains the same for the primary care provider (PCP) and the 60.6 million United States residents who report speaking a language other than English in their homes [7,8]. This article will review current evidence with the aim of providing the PCP with a baseline of knowledge in order to adequately serve the bilingual community and the unique challenges that they represent.

Literature review

The author searched through PubMed, Web of Science, and Google Scholar databases to find articles published between 1999 and 2015 that pertained to bilingualism in the pediatric population. Key words in the search included bilingualism, bilingual advantage, bilingual disadvantage, second language acquisition and English as a second language. The results of this search yielded 38 articles. Articles met inclusion criteria if they covered the differences and/or similarities between monolingual and bilingual individuals in the pediatric population. Additional articles were included if they provided relevant background information, physiological differences, information on diagnostic tools and other factors to consider when interacting with the bilingual child.

Case scenario

Edgar, a 12-year-old boy presents to the office with a stomachache, accompanied by his mother who does not speak any English. The child says that he is capable of translating for the mother to which the mother agrees. This is the first time you have met this patient since his family's immigration from El Salvador three years ago. Through an immersion program at his school he has been able to learn some English, but speaks exclusively Spanish at home. Throughout the visit, his mother occasionally appears to have questions but her son brushes her off, explaining that she is asking simple questions that he can answer for her later. The visit reveals no significant history or exam findings aside from the stomachache, but the child mentions that he doesn't feel he is doing well enough with his English relative to all of the other new immigrants in his class. Edgar explains that his teachers want to have him evaluated for learning disabilities, although he feels that his challenges are simply due to his less than perfect English and he excels at sciences and math. You send him home with school performance reports to be completed by his teachers, and schedule a follow-up for when the evaluations are completed.

In the initial visit with this child, his language skills may not be of any concern to you since he translated well and conversed comfortably; however, when addressing his worry at school, it is important to differentiate between difficulty with learning a second language (L2) and primary language impairment (PLI). If missed, these issues might translate into larger issues at a later date and could have significant impact on the family dynamic. Early identification of children facing these challenges is an important role of the PCP.

Bilingualism in childhood

Bilingualism research is an area of increasing interest and the landscape of information is accordingly in flux, but bilingual children and their families remain constant. Understanding the neuronal background of the bilingual child provides insight to the tasks that will be challenging as well as those at which he or she will excel, thereby allowing the PCP to provide appropriate anticipatory guidance and quality healthcare.

Bilingualism is a multifaceted phenomenon with social, psychological and academic implications. Bilingualism can result from a variety of different circumstances and differs according to age of acquisition, extent and type of language exposure [9]. The formative period of language acquisition to achieve bilingualism is not definitive and doesn't necessitate early bilingual exposure but differences in order of acquisition are reflected in bilingualism terminology **(Table 1 and 2)** [10]. Simultaneous bilinguals are those children who were exposed to both languages from a young age and begin to acquire both languages as an L1 [9,11]. In contrast, sequential or successive bilinguals are those children who acquired L1 before the age of 3, during the rapid language acquisition period and later learned L2 [9].Although both of these groups will be referred to as bilinguals, order of acquisition will contribute to differences in vocabulary abilities that must be addressed. Furthermore, language progression as well as language loss may occur over a child's lifetime, emphasizing the need to approach bilingualism as a fluctuating construct with the potential to change according to the child's circumstances.

Table 1. Abbrevations.

Abbreviations	
SN	School Nurse
PCP	Primary Care Provider
L1	Primary Language
L2	Secondary Language
EF	Executive Function
TD	Typically developing
PLI	Primary Language Impairment
SES	Socioeconomic Status
ASD	Autism Spectrum Disorders

Table 2. Bilingualism Terminology and Definitions.

Term	Definition
Simultaneous Bilingual	An individual who has been exposed to both languages from very early in life, who has acquired both languages as L1 [9,11].

Successive Bilingual	An individual who acquires L1 before the age of 3, during the rapid language acquisition period and later learns L2. There is a clear 'primary' language [9,11].
Sequential Bilingual	Synonym for successive bilingual
Additive Bilingualism	A term that suggests that reaching a minimal level of competence in both primary and secondary language has positive effects on intellectual development and learning L2 does not threaten L1 competence [21].
Subtractive Bilingualism	The approach to language learning that promotes the learning of L2 at the expense of L1 resulting in L1 loss [11].

Note. Adapted from "Learning difficulties or learning English difficulties? Additional language acquisition: An update for paediatricians," by V Clifford, A Rhodes, and G Paxton, 2013, Journal of Paediatrics and Child Health, 50:175-181.; "Language, culture and adaptation in immigrant children," by CO Toppelberg and BA Collins, 2010, Child and Adolescent Psychiatric Clinics of North America, 19:697-717.; "When learning a second language does not mean losing the first: Bilingual language development in low-income Spanish speaking children attending bilingual preschool," by A Winsler, RM Diaz, L Espinosa and JL Rodriguez, 1999, Child Development, 70(2), 349-362.

THE EFFECTS OF BILINGUALISM

Bilingual advantage

Being bilingual has impact, both positive and negative, on an individual's cognitive make up. Bilingual advantage is defined as the general superior performance of bilingual individuals over their monolingual peers in certain areas of cognitive function.

Executive function

The capacity to control and regulate cognitive processes. Bilingual advantage is thought to be due to improved executive function (EF), which strengthens the cognitive processes that provide working memory, sustained attention, cognitive flexibility, attentional switching, inhibitory control, information processing, and problem solving **(Table 3)** [1,6,8].

Table 3. Cognitive Process Terminology Frequently Used in Bilingualism Research.

Term	Definition
Executive Function	An umbrella term that is describes the cognitive processes involved in solving problems, interpreting and incorporating new information, and other complex cognitions such as generating strategy [14].
Working Memory	The cognitive process that allows for a limited quantity of information to be temporarily held in an available and easily accessible state [6].
Sustained Attention	The cognitive ability to stay focused on the task at hand without distraction. Supported by executive function
Cognitive Flexibility	A component of executive function, this is a cognitive process that allows for deliberate and controlled attentional shifts [6].
Attentional switching	Synonymous to cognitive flexibility
Inhibitory Control	The cognitive process involved in being able to learn information, then suppress intereference from learned information in a new setting that requires a new strategy [12].
Information Processing	The theory that there is a active processing and evaluation of all incoming information as opposed to merely a response to stimuli. Supported by executive function.
Problem Solving	The cognitive process of applying active effort to interpret and manipulate information in order to solve a problem

Note. Adapted from "Cognitive and linguistic correlates of early exposure to more than one language," by N Akhtar and JA Menjivar, 2012, Advances in Child Development and Behavior, 42, 41-78.; "The benefits of being bilingual: Working memory in bilingual Turkish-Dutch children," by E Blom, AC Kuntay, M Messer, J Verhagen and P Leseman, 2014, Journal of Experimental Child Psychology, 128, 105-119.; "Executive functions and their disorders," by R. Elliott, 2003, British Medical Journal, 65, 49-59.

Inhibitory control

Current thinking is that bilingual children are better able to efficiently allocate the brain's finite supply of attentional resources to the task at hand. Bilingual children are thought to be constantly monitoring and inhibiting the unused language [10]. The cognitive process of suppressing interference from previously learned information is thought to contribute to the bilingual brain's greater ability to handle quick cognitive switches and is evidenced by superior performance on visuospatial working memory tasks as well as verbal working memory tasks [6,12].

Conflict management and control

Bilingualism doesn't cause a domain general cognitive improvement, rather it can lead to superior performance on tasks that require conflict management. Greater need for selective attention and interference suppression to identify incongruent information yields larger bilingual advantage [2,13].

Cognitive flexibility

Continuous switching demands as seen in individuals enrolled in bilingual education or living in bilingual homes, are thought to promote cognitive flexibility [14]. This enhances attentional processing improves cognitive reserve which may serve to protect against symptoms of dementia as the individual ages [8,12].

Bilingual disadvantage

As mentioned, research results disagree on the existence of universal bilingual advantage on executive function tasks [4]. In a study by Chen et al., results showed the advantages seen in bilingual children tend to be isolated to lab settings, and are primarily seen in children with the highest bilingual proficiencies [15]. It is thus imperative that the bilingual disadvantages are considered by the PCP.

Difficulty acquiring English

It takes 2-3 years for immigrants to acquire enough English to allow for conversational competence and 4-5 years to achieve enough English proficiency for academic success [13]. This lag can lead to a disadvantage in social situations, and these children are at risk for missed academic advancement, which is clearly evidenced by the inferior academic performance of new bilinguals compared to their monolingual peers [16]. Not only are bilingual children reported to be slower at language processing and comprehension than monolingual children, composite vocabularies of bilingual children with equal exposure to primary language (L1) and L2 are significantly smaller than that of an age matched monolingual child [13]. A likely explanation for this phenomenon in simultaneous bilingual children is fewer repeat exposures to each word in each language, which minimizes vocabulary retention. Interestingly, differentiation between expressive and receptive vocabulary reveals that the bilingual disadvantage applies exclusively to receptive vocabulary. Final conclusions on this topic are debated but important to consider when considering targeted supplemental education [17].

Cognitive tasks

Bilinguals are slower than monolinguals at picture naming and lexical decision-making, the process involved in understanding words out of context [18]. Gathercole et al., suggested that when multiple tests are done to assess bilingual advantage on EF tasks, no significant advantage is seen [19]. Further research to clarify results is needed.

Effects of bilingualism on academic performance

Research that implies bilingual advantage on academic performance due to enhanced development of executive function and working memory has lead to consideration of the possibility that all children could benefit from bilingualism [1,5,6]. Yet, despite the ultimate benefits of L2 acquisition it is not instantaneous. Although children are often quickly able to converse socially in L2, it can take 4-5 years for a child to become proficient enough in L2 to achieve academic competence. For children learning L2 in the second decade, this means they may never reach academic competence before graduation, thereby limiting their options for further education or employment [11].

The time consuming yet invaluable nature of L2 acquisition make dedicating all available resources towards learning L2 a enticing pursuit, including elimination of L1. This is discouraged, as continuing L1 input does not detract from L2 acquisition, nor does L2 necessitate decreased L1 proficiency [20]. In fact, consistent education and support of L1 are more tightly correlated to success with L2 learning than the number of hours spent dedicated exclusively to learning L2 [11]. This should reassure the provider trying to help a student assimilate to new situations, and assuage any parental fears of their child losing L1 [21].

Despite this supportive evidence, the Bilingual Education Act of 1968, which funded non-English education, was allowed to lapse in 2002 [22]. No national policies have been put in place to promote bilingual educational opportunities since, leaving states to act independently. In response, California, Arizona and Massachusetts passed proposition 227, making English the default language of instruction for all children with no bilingual option [23]. The proposition passed on the understanding that children in English-only programs would have better academic outcomes than those in bilingual programs but arguments against it contend that preventing the use of L1 will make learning L2 more difficult, placing them at a disadvantage [24].

While evidence supports bilingual education as the best way to promote efficient L2 learning, there are arguments to the contrary. Longitudinal comparison of reading comprehension skills in monolingual 3rd graders versus sequentially bilingual 3rd graders showed that L2 learners' success was largely predicted by vocabulary volume in addition to reading accuracy, whereas monolinguals' success was predicted by reading accuracy alone. Since vocabulary was so highly predictive of bilingual success, authors argued that additional language support (tutoring, additional class time) should be offered ensure true academic success [16]. This evidence may underscore the benefits of an English only learning policy, or simply highlight that these children require extra help. Ideally research results guide policy and practice and it is imperative that the PCP know local educational legislation and available resources as these can have significant impact on the lives of bilingual patients.

Neural Connectivity Differences

Brain plasticity

Changes brought on by bilingualism impact a child's language ability as well as their neural signature; the differences in neural areas that are involved in language related cognitive tasks when comparing bilinguals and monolinguals **(Table 4)** [25]. Studies on preemies born during the third trimester demonstrate the capacity of the brain to recover from some degree of early brain injury through synaptogenesis and dendritic growth, proving the brain's capacity for neuronal plasticity in response to the

environment [1]. Later in life, neural changes are brought on by experiences, cognitive demand and environmental input including new language acquisition. Intensity and frequency of exposure to a new language effect structural and functional connectivity variations in the left hemisphere [26,27]. Neural connectivity changes occur most rapidly in the first two years of life (Head et al, 2015) and earlier L2 acquisition is correlated with greater grey matter changes, but small neuronal alterations occur throughout life when an individual acquires an L2 [26,28].

Table 4. Functions and Relevance of Specific Neuronal Regions.

Neuronal Region	Abbreviation	Function	Bilingual vs. Monolingual difference
Left mid fusiform gyrus (Visual word form area)	VWFA	Visual word recognition - link orthography with phonology and meaning	
Inferior Parietal Lobe	IPL	Involved in the conversion of orthography into phonology	Bilinguals show greater recruitment of left IPL. Increase in grey matter inversely related to the age of second language acquisition [28].
Left inferior frontal gyrus	LIFG	Classical language area. Involved in syntax, morphology, semantics, phonology and word retrieval	Greater variability of activation in bilinguals [25].
Superior temporal Gyrus	STG	Involved in phonological processing	Bilinguals show greater recruitment of left STG [25].
Dorsolateral prefrontal cortex	DLPFC	Involved in working memory control and attentional resources, critical for reading	Bilinguals show greater recruitment of DLPFC [25].
Rostrolateral prefrontal Cortex	RLPFC	Higher cognitive brain area	Greater variability of activation in bilinguals [25].
Left Arcuate Fasciculus	LAF	White matter tract that connects posterior and anterior language cortices and the left inferior longitudinal fasciculus	

Note. Adapted from "Development of neural systems for reading in the monolingual and bilingual brain: New insights from functional near infrared spectroscopy neuroimaging," by KK Jasinska, and LPetitto, 2014, *Developmental Neuropsychology*, 39:421-439.; "Structural plasticity in the bilingual brain: Proficiency in a second language and age at acquisition affect grey-matter density," by A Mechelli, JT Crinion, U Noppeney, JP O'Doherty, J Ashburner, RS Frackowiak, and CJ Price, 2004, Nature, 431:757

Neuronal variations of the bilingual brain

Differences in white matter tracts in the brain have been proposed as the biological basis for the bilingual advantage that allows for faster and more efficient information transmission [18]. In a study of English-speaking university students learning Mandarin, it was shown that proficiency in Mandarin after one month of intensive training could be predicted by pre-learning white matter microstructure in the right inferior longitudinal fasciculus (ILF) and right superior longitudinal fasciculus (SLF). Both fasciculi are pathways that link together known language areas of the brain [27]. While white matter change is expected with language acquisition, the significant change in right hemisphere rather than left is surprising given the known correlation of left hemisphere neural areas such as Broca and Wernicke's areas, to language. Since the study group in this study was learning Mandarin, it was thought that right hemisphere involvement might be due to the differences between alphabetic languages and tonal languages; however, other studies on bilingual individuals have showed that even when English is the L2, there was increased bilateral hemisphere activation, suggesting that right hemisphere involvement is universal to bilingualism although the implications of this are not clear.

In addition to ILF and SLF, increased volume of the inferior frontal gyrus (IFG) and the anterior temporal lobe have also been correlated to proficiency in a second language. Using 'graph efficiency' data, which measures information flow through neural networks, Garcia-Penton et al., showed significantly increased graph efficiency in two sub-networks involved in phonological, syntactic and semantic processing, when comparing the bilingual group to monolinguals [18]. These strengthened connections may be responsible for the improved executive function and other bilingual advantages that are seen, but they may also lead to concurrent neglect of parallel processing in the whole brain. This neglect may explain the bilingual disadvantages such as difficulty with picture naming and lexical decision-making [18].

Research on monolingual children has been used to elucidate the particular neural areas that are involved in each language related cognitive task and to compare how bilinguals differ from monolinguals **(Table 4).** Studies using functional near infrared

spectroscopy (fNIRS) neuroimaging, which is considered to be a closer measure of neuroactivity than fMRI, compared bilingual brains to monolingual brains and found differences in neural activation patterns between the two groups. Bilinguals demonstrated greater activation of a number of neural regions including the IFG; left superior temporal gyrus (STG); and left inferior parietal lobe (IPL), all of which are classic language areas of the brain; the dorsolateral prefrontal cortex (DLPFC) which is involved in working memory control; and the rostrolateral prefrontal cortex (RLPFC) which is involved in reasoning and integrating information. These differences and their associated advantages make up the bilingual neural signature [25].

Bilingualism and cultural differences

Bilingualism is the result of external influence, and real children do not exist in isolated lab settings. As such, the implications of differences between bilinguals and monolinguals must be considered in the context of social and cultural factors.

Socioeconomic status and bilingualism

In the United States, bilingual children tend to occupy uniquely lower socioeconomic status (SES) niches relative to their monolingual peers. Therefore lower performance on language comprehension tasks need to take both factors into consideration, which is best done by considering bilingualism as a component of the environment [13]. It has been proposed that the positive impacts of bilingualism on working memory and executive function may compensate for the negative effects of low-SES, but evidence that bilingualism and high SES have independently positive impacts on EF and language ability support the idea that children from all levels of SES can benefit from bilingualism [2,5,6]. Foreign-language education is clearly an important component of the curricula of low SES children as a method to minimize the academic achievement gap [2].

Impact of bilingualism on cultural identity

Switching between cultural frames of reference may strengthen a child's ability to adapt to change and develop a more nuanced representation of culture and self [15]. Adaptation promotes acclimation to a new culture, yet the impact of bilingualism and potential loss of proficiency in L1 (subtractive bilingualism) has been blamed for having detrimental effects on family dynamics. L1 loss may impair communication across generations, which is not only detrimental to familial support systems, but also hinders the acquisition of L2 [9,21]. Despite parental concerns that L2 acquisition requires abandonment of L1 evidence has shown that minimizing the detrimental effect of L2 acquisition on L1 is dependent on continuous exposure to L1, and that this exposure will not detract from learning L2 [9,21].

Bilingualism and family relationships

L1 loss can impact interaction between the child and non-bilingual family members and may effect family dynamic. This is of particular concern to the medical provider in the office setting where the provider does not speak the same language as the family member. In these scenarios, families may opt to have their bilingual children translate for reasons including comfort, trust, privacy, or the attempt to not 'burden' the provider with finding a translator. This can positively or negatively impact family dynamic. Some children who have been asked to translate for their parents feel honored to assume responsibility and help their family. Conversely, some experience discomfort when discussing 'embarrassing' issues or conveying bad news to their elders. In general, a child should not be used as a translator as it has a negative impact on health care and risks upsetting the balance of the parent-child relationship [29-32]. The clinician should be further aware that per U.S. Department of Health and Human Services, national standards for linguistically and culturally competent care require that health care organizations provide language assistance services, including bilingual staff and interpreter services at no cost to the patient [31].

Understanding that different cultures place significantly different importance on family values is important. In the Hispanic culture, the largest proportion of immigrants in the U.S., family relationships are often valued over personal goals, which contrasts traditional European and American values, which highlight the individual over the family [32]. As a result, a Hispanic child may feel it is his or her family obligation to translate, despite discomfort, while the provider may assume that the child would not agree if he or she did not want to do so. For these reasons, it is important to determine the motivation behind having a family translator and use a professional medical translator whenever possible [30]. Unfortunately, despite national standards regarding translator provision, 57.1% of primary care pediatricians report using a family member to translate. The cost of translator services can be restrictive in small community practices, but PCPs should know that Medicaid and CHIP are required to provide reimbursement for translator services and every effort should be made to have this service available when interacting with bilingual children and their non-bilingual family members [29,30].

BEYOND BILINGUALISM – OTHER CONSIDERATIONS

Language impairment in bilingual children

Differentiation between learning disabilities and difficulty learning English can be challenging, but is crucial to ensuring academic success. Bilingual children with primary language impairment (PLI) often present with impairment in both L1 and L2 but it is often assumed that poor L2 skills are due to a lack of adequate time to achieve proficiency, and not due to a PLI [11,33]. Bilingual children with PLI have fewer internal resources for language learning, and are at higher risk for deterioration or loss of

L1 skills than typically developing (TD) bilingual children [34]. These children are particularly in need of extra support services since maintenance of L1 is important to support L2.

Language acquisition pathways

Bilingualism does not cause language disorders or delay; however, bilingual children who have primary language disorders take longer to learn the microstructure of languages, which significantly delays cross-linguistic skill transfer [20,35,36]. Delayed language skill acquisition may also be mistakenly blamed on introduction of an L2 rather than a PLI, leading to delayed diagnosis.

Skill transfer difficulty does not just apply to initial language acquisition, but is also important when considering therapy modalities for bilingual children. For Spanish-English bilingual children with a PLI, speech therapy provided in English was found to promote improvements in English language skills; however, they had a significantly harder time transferring learned skills from English to Spanish relative to TD bilingual peers. Thus, bilingual therapy in which instruction is provided in L1 with L2-L1 connections and reinforcements throughout the teaching process is preferable over English only language therapy. Bilingual therapy for children with PLI decreased L1 attrition, while having comparable L2 learning to the English only therapy cohort (Pham et al, 2015)

Implications for the primary care provider

Appropriate Screening of Bilingual Children

Identification of language impairment in bilingual children is a critical. In all children, L2 acquisition may lead to slowing or regression of L1, which can lead to over diagnosis of language impairments [37]. On the other hand, high levels of conversational fluency in bilingual children can mask language comprehension issues [16]. Lack of evaluation methodology and standards, may result in delayed evaluation referrals for bilingual children, resulting in delayed identification of PLI, delayed service implementation, and a widened achievement gap for these already disadvantaged children. When bilingual testing and services are not available for a child's L1, under diagnosis of PLI is likely [9,17,33]. Although not ideal, testing in English can be used to identify PLI in bilingual children within certain constraints. Newly bilingual toddlers who receive 60% exposure to English test equivalently to monolingual children on the preschool language scale and the British picture vocabulary scale [17]. School aged children who have been attending English-speaking school for at least a year, and are speaking English for at least 30% of the day can be accurately evaluated using the EpiSLI model [33]. These results support increased ease of language impairment identification allowing for earlier, more accurate referral to speech therapy and better subsequent language acquisition.

Bilingualism and developmental delay

Aside from the M-CHAT, an autism-screening tool that is available in Spain-Spanish and Western Hemisphere Spanish, there are few appropriate screening tools for developmental delays in the bilingual population [38]. Use of developmental screens by primary care pediatricians in the United States is low across the board, (42.9% screened for ASD), and even fewer (28.7%) screening in Spanish. Regardless of race, children with autism and other developmental disabilities have significantly worse health care access, use and outcomes [39,40]. English proficiency is predictive of access and use of the health care system, and the relationship between health care use and ethnicity is moderated by the quality of care provided [39,40]. Improved bilingual care could serve to increase trust in the healthcare system, thereby increasing PCP visits and decreasing the healthcare disparities often seen in this marginalized group.

Case denouement

Edgar's story is an example of a case where cultural competence and appropriate interpretation services could have made a significant difference in the outcome of his care. In one scenario, Edgar continues on his current trajectory and completes his academic career with a subpar education. Alternatively, Edgar and his mother are provided with interpreter services, and this routine visit yields an opportunity for all medical and psychosocial issues to be addressed. As a first line provider, the PCP has the opportunity to open doors to a future filled with greater access to services and a brighter outcome.

CONCLUSION

Bilingualism presents in many shapes and sizes, and regardless of whether attention is paid to advantages or disadvantages, the uniqueness of each patient cannot be dismissed. There is a wide range of issues that face the bilingual patient, many of which were discussed in this article. Accurate understanding and a strong relationship between PCP and patient is an imperative element of providing high quality care and is predictive of appropriate healthcare use. Increased visit frequency leads to increased anticipatory guidance, monitoring and management and the PCP should be equipped with knowledge of available resources and current bilingualism research so as to provide the most up to date and accurate management strategies to the bilingual patient.

REFERENCES

1. Head LM, et al. Bilingualism as a potential strategy to improve executive function in preterm infants: A review. J Pediatr Health Care.2015;29:126-136.

2. De Abreu PM, et al.. Bilingualism enriches the poor: Enhanced cognitive control in low-income minority children. Psychol Sci. 2012;23:1364-1371.

3. De Kieviet JF, et al. Brain development of very preterm and very low-birth weight children in childhood and adolescence: A meta-analysis. Dev Med Child Neurol. 2012;54:313-323.

4. De Bruin A, et al. Cognitive advantage in bilingualism: An example of publication bias? Psychol Sci. 2015;26:99-107.

5. Calvo A and Bialystok E. Independent effects of bilingualism and socioeconomic status on language ability and executive functioning. Cognition. 2014;130:278-288.

6. Blom E, et al. The benefits of being bilingual: Working memory in bilingual Turkish-Dutch children. J Exp Child Psychol. 2014;128:105-119.

7. Camille Ryan (2011) Language Use in the United States. American Community Survey Reports, USA.

8. Bialystok E, et al. Bilingualism: Consequences for mind and brain. Trends Cogn Sci. 2012;16:240-251.

9. Toppelberg CO and Collins BA. Language culture and adaptation in immigrant children. Child Adolesc Psychiatr Clin N Am. 2010;19:697-717.

10. Cristoffels IK, et al. Two is better than one: Bilingual education promotes the flexible mind. Psychol Res. 2015;79:371-379.

11. Clifford V, et al. Learning difficulties or learning English difficulties? Additional language acquisition: An update for paediatricians. J Pediatr Child Health. 2013;50:175-181.

12. Akhtar N and Menjivar JA. Cognitive and linguistic correlates of early exposure to more than one language. Adv Child Dev Behav. 2012;42:41-78.

13. Buac M and Kaushanskaya M. The relationship between linguistic and non-linguistic cognitive control skills in bilingual children from low socio-economic backgrounds. Front Psychol. 2014;5:1-11.

14. Elliot R. Executive functions and their disorders. Brit Med Bull. 2003;65:49-59.

15. Chen SH, et al. Variations on the bilingual advantage? Links of Chinese and English proficiency to Chinese American children's self-regulation. Front Psychol. 2014;5:1-11.

16. Burgoyne K, et al. The development of comprehension an reading-related skills in children learning English as an additional language and their monolingual English-speaking peers. Br J Educ Psychol. 2011;81:344-354.

17. Cattani A, et al. How much exposure to English is necessary for a bilingual toddler to perform like a monolingual peer in language tests? Int J Lang Commun Disord. 2013;49:649-671.

18. Garcia-Penton L, et al. Anatomical connectivity changes in the bilingual brain. NeuroImage. 2014;84:495-504.

19. Gathercole VC, et al. Does language dominance affect cognitive performances in bilinguals? Lifespan evidence from preschoolers through older adults on card sorting, Simon, and metalinguistic tasks. Front Psychol. 2014;5.

20. Verhoeven L, et al. Linguistic transfer in bilingual children with specific language impairment. Int J Lang Commun Disord. 2012;47:176-183.

21. Winsler A, et al. When learning a second language does not mean losing the first: bilingual language development in low-income, Spanish-speaking children attending bilingual preschool. Child Dev. 1999;70:349-362.

22. Azken Txostena. The basic discourses on the language development, 2015.

23. Patricia Gándara. The Impact of English-Only Instructional Policies on English Learners.

24. McCardle P. Bilingualism: Research and Policy. New Dir Child Adolesc Dev. 2015;147:41-48.

25. Jasinska KK and Petitto J. Development of neural systems for reading in the monolingual and bilingual brain: New insights from functional near infrared spectroscopy neuroimaging. Dev Neuropsychol. 2014;39:421-439.

26. Li P, et al. Neuroplasticity as a function of second language learning: Anatomical changes in the human brain. Cortex. 2014;58:301-324.

27. Qi Z, et al. White-matter structure in the right hemisphere predicts Mandarin Chinese learning success. J Neurolinguist. 2014;33:14-28.

28. Mechelli A, et al. Structural plasticity in the bilingual brain: Proficiency in a second language and age at acquisition affect grey-matter density. Nature. 2004;431:757.

29. DeCamp LR, et al. Changes in language services use by US pediatricians. Pediatrics. 2013;132:e396-e406.

30. Free C, et al. Bilingual young people's experiences of interpreting in primary care: A qualitative study. Br J Gen Pract. 2003;53:530-535.

31. US Department of Health and Human Services. Culturally and Linguistically Appropriate Services in Health Care, 2001.

32. Devos T, et al. Implicit orientation towards family and school among bilingual Latino college students. J Soc Psychol. 2008;148:449-471.

33. Gillam RB, et al. Identification of specific language impairment in bilingual children:Assessment in English. J Speech Lang Hear Res. 2013;56:1813-1823.

34. Pham G, et al. Bilingual children with primary language impairment: 3 months after treatment. Int J Lang Commun Disord. 2015;50:94-105.

35. Kendall King and Lyn Fogle. Raising Bilingual Children: Common Parental Concerns and Current Research, 2006.

36. Squires KE, et al. Story retelling by bilingual children with language impairments and typically developing controls. Int J Lang Commun Disord. 2014;49:60-74.

37. Kohnert K. Language disorders in bilingual children and adults. San Diego, CA: Plural Publishing, 2008.

38. Kimple KS, et al. Performance of the modified checklist for autism in toddlers and Spanish-speaking patients. Clin Pediatr. 2014;53:632-638.

39. Yu SM and Singh GK. Household language use and health care access, unmet need and family impact among CSHCN. Pediatrics. 2009;124:414–419.

40. Parish S, et al. Health care of Latino children with autism and other developmental disabilities:Quality of provider interactions mediates utilization. Am J Intellect Dev Disabil. 2012;117:304-315.