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# Language Development and the Presence of Language Delays and Disorders in Individuals with Non-syndromic cleft Lip and Palate

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# LANGUAGE DEVELOPMENT AND THE PRESENCE OF LANGUAGE DELAYS AND DISORDERS IN INDIVIDUALS WITH NON-SYNDROMIC CLEFT LIP AND PALATE

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Articulation and resonance disorders are the two that are most commonly paired with the cleft lip and palate population (D'Antonio & Scherer, 2008). As a result, the majority of the research available pertaining to cleft lip and palate relates to disorders of consonant articulation and vocal quality (American Speech-Language and Hearing Association [ASHA], 1973). There is also evidence of delays in expressive language, acquiring phonetic and phonological speech production, and higher-level language, in addition to literacy problems in later childhood (Morris & Ozanne, 2003). Due to range of variables that may impact communication in individuals with cleft lip and palate, there is a lack of consensus among current research as to the common characteristics of the communication deficits present in this population (D'Antonio & Scherer, 2008). One area where this lack of consensus is seen is in language development and the presence of language disorders in individuals with cleft lip and palate (D'Antonio & Scherer, 2008). This is literature review of language development and the prevention of language delays and disorders in individuals with non-syndromic cleft lip and palate in order to discover whether language development is disordered, and what measures can be applied to prevent language delays and disorders as a result of the cleft impact on language development.

**Types of Clefts**

The size and severity of clefts vary for each individual; the Veau system is one of the classification system commonly used, and has been in place since the 1930s to help clinicians classify clefts accurately (Bzoch, 1997). According to the Veau system, there are four classes of clefts: class I consists of only a cleft of the soft palate, class II consists of clefts on the hard and soft palate to the incisive foramen, class III includes a complete unilateral cleft of the soft and hard palate and of the lip and alveolar ridge on one side, and class IV is comprised of a complete

bilateral cleft of the top lip and alveolar ridge on both sides and/or a bilateral cleft on the soft or hard palates (Bzoch, 1997).

**Syndromic clefts versus non-syndromic clefts.**

Clefts of the lip and palate are among the most common congenital anomalies worldwide (Stanier & Moore, 2004). In the United States, the occurrence of a cleft lip or palate is seen in approximately one out of every 750 live births (Grames, 2008). The majority of cleft lips and palates are of multifactorial origin and result from the interaction of biological and environmental factors (Cobourne, 2004). It has been reported that a majority of cleft lip and palate cases (approximately 70%) are considered non-syndromic, meaning the cleft is not present due to a syndrome and the cleft occurs without other anomalies (Stanier & Moore, 2004). The remaining cases of cleft lip and palate are considered syndromic in nature, and have additional characteristics that can be subdivided into categories of chromosomal aberrations, teratogenic effects, and various syndromes (Stanier & Moore, 2004).

**Importance of Early Intervention**

Clefts of the lip are often surgically closed at about three months of age, while clefts of the hard palate may not be closed until nine and twelve months or later (Kuehn & Henne, 2003). It has been suggested that palatal repair surgeries are not being completed early enough for optimal speech and language development (Hardin-Jones, Chapman, & Scherer, 2006). A number of clinical practitioners have lobbied for early palatal surgery to help minimize the development of compensatory articulation patterns (Dorf & Curtin, 1982). Many researchers have reported better speech outcomes with earlier palatal surgery when preformed before the onset of first words (Hardin-Jones & Jones, 2005). Children with cleft lip and palate often undergo surgical repair during important periods of early language development (Snyder &

Scherer, 2004). Speech and language development may be delayed simply due to the disruptive effects of surgery during a critical developmental period (Snyder & Scherer, 2004). Thus, rather than waiting for first words surgery should be conducted prior to the onset of canonical babbling (Hardin-Jones, Chapman, & Halter, 2003). In their research, Chapman and Hardin (1992) found that the participant that presented with the most severe phonologic problem was also the child that had the latest surgical repair at 20 months of age. In contrast, one participant that underwent palatal repair surgery at 19 months of age was found to have a nearly normal profile for phonologic functioning (Chapman & Hardin, 1992). Speech outcomes are just one of the many considerations that influence how and when early palatal surgery is performed, health status of child is also important factor (Hardin-Jones et al., 2006).

Additionally, in some cases more than one reconstructive surgery may be required to surgically correct the cleft (Owens, Metz, & Farinella, 2007). In cleft lip and palate cases, the primary goal of a speech-language pathologist (SLP) prior to reconstructive surgery is to reduce the impact that the cleft may have on developing communication skills through the use of early intervention therapy (Hardin-Jones et al., 2006).

Early intervention is critical for prelinguistic vocalizations and later language development. Apparently, there is a need of more research regarding early palatal repair and early intervention. Future studies examining speech and language outcomes for palatal repair surgery performed at various ages (prior to canonical babble, prior to onset of first words, post onset of first words), and the effect of early intervention services along with age at repair could be beneficial in creating a stronger evidence-based practice for treatment

### Cleft palate team.

When involved in the case management of an individual with a cleft speech-language pathologists (SLPs) often work with other specialists on a cleft palate team, also known as a craniofacial team (Owens et al., 2007). Members of a cleft palate include an SLP, audiologist, plastic surgeon, dentist, orthodontist, otolaryngologist, pediatrician, nurse practitioner, genetic counselor, psychologist, and parents of the patient (Owens et al., 2007). Members of the cleft palate team are not limited to the ones listed and can include a variety of additional professionals depending on the specific needs of the patient such as the severity of the cleft, syndromic versus non-syndromic cleft, presence of a hearing loss, feeding and swallowing problems (Owens et al., 2007). However, the American Cleft Palate-Craniofacial Association requires that a surgeon, orthodontist, SLP, and one other specialist be included in the team (Owens et al., 2007). The cleft palate team is assembled to help provide effective services throughout the lifespan of an individual with a cleft through the collaboration of the professionals that are part of the cleft palate team (Owens et al., 2007). The roles of the cleft palate team members' change in accordance to the needs of a person with cleft throughout their lifespan (Owens et al., 2007). Given the cleft palate team often works closely together it is important that SLPs are aware of the specific roles and concerns of other team members (Owens et al., 2007). The SLP focuses primarily on the management of the communication problems associated with clefts (Owens et al., 2007).

## Relationship of Speech and Language Development

Speech characteristics and development tend to be one of the primary focuses of the available research pertaining to individuals with clefts (D'Antonio & Scherer, 2008). Researchers have determined that there is an inextricable link between speech and language

(D'Antonio & Scherer, 2008). Current literature indicates that delays in phonetic development are linked to slower lexical development in late talkers (Stoel-Gammon, 1989). Therefore, delays in speech development in infants with clefts may lead to delays in language development. However, since the relationship between early speech and later speech and language development of the cleft population has become an area of interest to researchers in the last few years, there is limited data available pertaining specifically to this population (Chapman et al., 2003).

There are two phases of communication development: prelinguistic and linguistic (D'Antonio & Scherer, 2008). The prelinguistic phase is characterized by babbling and gestural communication (D'Antonio & Scherer, 2008). Canonical babbling is considered a significant milestone in speech and language development because unlike productions of earlier development these productions resemble adult words and the meaningful words of young children (Chapman, Hardin-Jones, Schulte, & Halter, 2001). The linguistic phase is characterized by the onset of true words and the development of spoken language (D'Antonio & Scherer, 2008). Research studies focusing on prelinguistic and presurgery vocalizations have suggested that infants with a cleft palate produce fewer pressure consonants, particularly oral stops, and show a preference for glottal place features as compared to noncleft infants of the same age (Chapman, Hardin-Jones, & Halter, 2003).

Over the last 25 years, the relationship of prelinguistic behaviors and later speech and language development has been studied by looking for similarities between babbling and meaningful speech in typically developing infants (Chapman et al., 2003). Delays in babbling for infants with cleft palate have been documented in parental report since the late 1950s (Bzoch, 1965). Many researchers have proposed various causes for canonical babbling delays for

individuals with cleft lip and palate. The structural anomalies caused by the cleft lip and palate result in an inability to impound intraoral air pressure due to oral-nasal coupling interferences with the production of high-pressure consonants, such as stops, which occur frequently in babbling (Chapman et al., 2001). Limitations in manner and place characteristics can have a serious impact on an infant's consonant inventory prior to surgical repair (Chapman et al., 2001). The presence of a hearing loss can also influence an infant's vocal development within the first year of life (Chapman et al., 2001). If the hearing loss is not identified and managed at an early age, individuals with cleft lip and palate may not be hearing the contrast of sounds in their own productions or the feedback that maybe given to them by a caregiver (Chapman et al., 2001). It is through repeated productions and feedback that infant vocalizations become more and more like sounds produced by the caregiver (Fry, 1966).

In the cleft population, many researchers have found a relationship between babbling and later language skills (Chapman et al., 2003). Chapman et al. (2003) examined the relationship between speech measures prior to surgery at 9 months of age, postsurgery at 13 months of age, and speech and language performance at 21 months of age for children with cleft lip and palate and their noncleft peers. This research revealed differences between the children with cleft lip and palate and their noncleft peers for several measures of speech and lexical development (Chapman et al., 2003). In four of the six measures obtained in this study (size of consonant inventory-all utterances, size of true consonant inventory-all utterances, size of consonant inventory- lexical items, and emerging consonants), children with cleft lip and palate produced four less consonants as compared to their noncleft peers (Chapman et al., 2003). Additionally, for children with cleft palate, correlational analyses indicated that true stop production, both immediately before and after palatal repair surgery, was positively correlated with a majority of

speech measures obtained at 21 months of age (Chapman et al., 2003). The data obtained postsurgery at 13 months of age indicated true stop production was related to later vocabulary development, and size of true consonant inventory was related to all measures of speech production and one measure of lexical development at 21 months (Chapman et al., 2003). In this study, the true canonical babbling ratio was the only measure for the noncleft group that was significantly correlated with any of the speech and/or language measures obtained at 21 months (Chapman et al., 2003). At 21 months of age children with cleft palate and lip were found to be making gains in speech acquisition following palatal repair, however they continued to fall behind in the production of consonants with labial, dental, alveolar, and velar placement as compared to their noncleft peers (Chapman et al., 2003). Chapman et al. (2001) compared the prelinguistic vocal development of 9-month-old infants with unrepaired cleft palate and their age-matched peers. Samples of the infants' spontaneous vocalizations were obtained at the infant's home while they interacted with their primary caregiver during spontaneous play (Chapman et al., 2001). Results of this research revealed that infants with cleft palate were delayed as compared to their peers in the onset of canonical babbling (Chapman et al., 2001). Of the participants involved in the study, only 57% of infants with cleft palate had reached the canonical babbling stage as compared to 93% of the noncleft infants (Chapman et al., 2001). In addition to delays in the onset of babbling, infants with cleft palate were found to have smaller canonical babbling ratios as compared to their age matched peers (Chapman et al., 2001). The group of infants with cleft palate was characterized by lower canonical babbling ratios, lower true canonical babbling ratios, and smaller consonant inventories for all sounds and true consonants than the group without cleft palates (Chapman et al., 2001). However, there was no significant difference found between the groups in the type, or length of their babbled

productions (Chapman et al., 2001). Related research focusing on individuals with developmental delays indicated that the amount of vocalizations, including amount with consonants, and amount used communicatively, was related to language growth in these individuals one year later (Chapman et al., 2001).

At-risk children with lower rates of consonant usage and reduplicated syllables in babbling were also found to exhibit lower language performances as late as 6 years of age (Jensen, Boggild-Andersen, Schmidt, Ankerhus, & Hansen, 1988). The amount and complexity of babbling has also been tied to later phonological development in a number of research investigations (Vihman, 1986; Vihman & Greenlee, 1987). Authors of available research suggest that infants with cleft palate have fewer opportunities to produce canonical syllables and high-pressure consonants during the prelinguistic stage and prior to palatal closure (Chapman et al., 2003). Due to fewer opportunities to produce canonical babbling, infants with cleft palate may receive less feedback from parents for communicative attempts, as there are fewer instances of canonical babbling for parents to respond to (Chapman et al., 2003). This in turn may impact lexical development in these individuals due to decreased language exposure (Chapman et al., 2003). Vocabulary delays have also been noted as early as 15 months and have been found to persist into adolescence (Broen, Devers, Doyle, Prouty, & Moller, 1998). Speech deficits present early on have been found to result in residual effects on the size of an individual's vocabulary and speech accuracy later in life (Hardin-Jones et al., 2006). Morris and Ozanne (2003) compared two groups of children with cleft lip and palate, one group with normal language development and the other with delayed expressive language. Individuals in the delayed expressive language group were found to have a phonetic inventory that was significantly smaller than their peers in the normal language development group (Morris & Ozanne, 2003).

The aforementioned research conducted by Chapman et al. (2003) found that true stop production was correlated with later speech and language performance. Additionally Chapman et al. (2003) have found that children with cleft palate and lip who produced more stops both before surgical repair of the palate and in the immediate postsurgical period, as well as those children who show an increase in size of true consonant inventory post surgery, have better consonant and lexical development at 21 months of age. Following surgical repair of the cleft lip and palate researcher have found that it is not uncommon to see a decrease in both the frequency and diversity of a child's vocalizations for up to six weeks (Hardin-Jones et al., 2006). However, following this six-week period the child should begin adding new consonants to their consonant inventory and expressive vocabulary (Hardin-Jones et al., 2006).

Many of these research findings are important factors that should be considered when it comes to the speech-language therapy services that the children with cleft lip and palate receive both pre and post surgical repair. Prior to and following surgical repair of the cleft lip and palate it is important to take into account the number of different speech sounds a child is producing and the manner in which these speech sounds are produced (e.g. stop, fricative, affricate) to help determine treatment goals. Given the important role of babbling on later speech and lexical development it is imperative that these individuals receive appropriate early intervention services. Additionally, it is important that the SLP working with this population are aware of the importance of building consonant inventories prior to surgical repair as well as post surgical repair. Further research focusing on babbling and later speech and lexical development at all ages for this population would be beneficial in helping with the identification of those who may be at-risk for later speech and language problems and how to improve on the clinical management and monitoring plans used with individuals in the cleft population.

**Phonetic versus Phonological**

Following surgical repair of the cleft lip and palate, the patterns of deficits noted during the prelinguistic periods and prior to palatal closure are still apparent in the early post surgical period (Chapman & Hardin, 1992). Compensatory articulation errors such as glottal stops and pharyngeal fricatives are characteristic of this population (D' Antonio & Scherer, 2008). However, children with an isolated cleft lip have been found to develop articulatory skills that follow a normal developmental pattern (Vallino, Zuker & Napoli, 2008). Children with cleft palate typically exhibit articulation abilities below age expectations (Bzoch, 1965). Speech production in these individuals is also affected by the high incidence of middle ear effusion and conductive hearing loss in the cleft population, the effect of dentition related errors, and velopharyngeal inadequacy (VPI) (Paradise, Bluestone, & Felder, 1969).

An estimated 58% of individuals with cleft lip and/or palate have an associated hearing loss (Kemker, 1997). The presence of a hearing loss can impact the ability of the individual with cleft lip and palate to accurately learn speech sounds (Owens, Metz, & Farinella, 2007). Research has acknowledged the presence of compensatory articulation errors due to the presence of resonance issues (D'Antonio & Scherer, 2008). Hypernasality, mixed resonance, weak pressure consonants, and compensatory articulation patterns may occur as a result of VPI (D'Antonio & Scherer, 2008). Additionally, persistence of atypical substitutions may be an early warning sign of velopharyngeal dysfunction for some children with cleft palate (Hardin-Jones et al., 2006).

Compiled research has shown that children with cleft lip and palate have a preference for producing labial, velar, and glottal sounds (D'Antonio & Scherer, 2008). These children make more errors on high-pressure consonants, particularly fricatives and affricates (Chapman et al.,

2001). Substitutions of stops and fricatives for nasals and glides are prominent characteristics of speech disorders in individuals with cleft lip and/or palate (Hardin-Jones et al., 2006). Additionally, a number of children with cleft palate who continue to produce nasal and glottal substitutions following surgical repair of the cleft were found to have limited consonant inventories and vocabulary usage (Hardin-Jones et al., 2006). These children also typically tend to produce limited oral stop consonants, and rely on the phonological processes of backing, nasal assimilations, and the use of compensatory errors (D' Antonio & Scherer, 2008). Present research suggests that with the target population, the absence of growth in their phonetic inventory or the persistence of nasal substitutions, or glottal stops are red flags that are red flag indicators that careful monitoring and early intervention is called for (Hardin-Jones et al., 2006).

Even though children with cleft palate commonly present with phonetic based problems due to the structural deviations associated with clefting, they may also be at risk for phonological disorders (Chapman, 1993). Morris and Ozanne (2003) suggest that many of the characteristics of cleft palate could be considered phonological processes because they commonly affect more than one consonant in any given place or manner class. The phonological processes that are typical of children with clefts include final consonant deletion, syllable reduction, stridency deletion, cluster reduction, backing, nasal assimilation, velar assimilation, nasalization, nasal preference, glottal replacement, stopping, and deaffrication (D'Antonio & Scherer, 2008; Morris & Ozanne, 2003). Speech sound errors may initially occur as consequences of the cleft, but over time become incorporated into the child's developing phonological rule system (Chapman, 1993). Chapman and Hardin (1992) investigated the phonetic and phonological skills of 2-year olds with cleft palate. The children with cleft palate that participated in this study all underwent palatal surgery after 12 months of age and after the onset of meaningful speech (Chapman &

Hardin, 1992). At 2-years of age although the cleft palate group showed poorer overall speech than their noncleft peers, the similarities were more noticeable than the differences (Chapman & Hardin, 1992). Both groups were similar in the number and types of phonemes present in their consonant inventories, which contained stops, glides, nasals, and liquids (Chapman & Hardin, 1992). However, differences were noted between the two groups in the accuracy of production for different manner categories (Chapman & Hardin, 1992). Chapman and Hardin (1992) found that 2-year-olds with cleft palate were less accurate in their production of nasals and liquids that their noncleft peers. In regards to phonological process usage, children with cleft palate used many of the same phonological processes as their noncleft peers; however, some atypical patterns were observed (Chapman & Hardin, 1992). Children with cleft palate used backing and nasal assimilation more frequently and more noticeably than their noncleft peers (Chapman & Hardin, 1992). Chapman and Hardin (1992) stated that children with cleft palates may originally use backing to compensate for an inadequate velopharyngeal mechanism. As a result, over time the rule may become incorporated into the developing phonological rule system and simply persist following palatal surgery (Chapman & Hardin, 1992). The authors did find that the participant that presented with the most severe phonological problem was also the child that had the latest surgical repair at 20 months of age (Chapman & Hardin, 1992). Additionally, with this specific participant the researchers found that she frequently used backing, even though the participant demonstrated the ability to produce phonemes with anterior placement in some contexts (Chapman & Hardin, 1992). Children with repaired cleft lip and palate in the three to five-year-old range continue to exhibit speech deficits that are characterized by developmental errors, nasal substitutions, compensatory articulation, and persistence of phonological processes (D'Antonio & Scherer, 2008). Research conducted by Chapman (1993) found that three-and-

four-year-old children with cleft palate exhibited more instances of process usage, compared to their noncleft peers. Backing was once again a phonological process used frequently by the participants with clefts in this study (Chapman, 1993). Stopping, stridency deletion and deaffrication also occurred more frequently in the speech of the children with cleft palate than their noncleft peers (Chapman, 1993). However, at age five, cleft and noncleft groups were similar in process usage (Chapman, 1993). From this information Chapman (1993) concluded that data from this study suggests that children with cleft palate present with early delays in phonological development compared to their noncleft peers.

Research suggests the presence of phonological disorders may be related to overall delays in expressive language, however few studies have focused on phonological disorders in these children (Spriestersbach, Darley, & Morris, 1958). In Morris and Ozanne's (2003) study of children with cleft lip and palate with normal language development and those with delayed expressive language, phonological development in the two groups showed significant differences in process usage. The normal language development group was found to employ developmentally appropriate phonological processes (Morris & Ozanne, 2003). On the other hand, the delayed expressive language group exhibited a more disordered profile of process usage and used many of the developmental processes significantly more than the normal language development group (Morris & Ozanne, 2003). For SLPs working with this population, it is important to determine whether articulation errors are phonetic or phonologic in nature to provide more effective intervention for the client with a cleft palate and/or lip, help prevent the development of a phonological disorder and later expressive language challenges.

**Presence of Language Delays and Disorders**

Research exploring the receptive and expressive language skills of the cleft population has

generated inconsistent findings (Frederickson, Chapman, & Hardin-Jones, 2006). Research conducted by McWilliams (1970) suggested that too little is known about the reduced language skills in children with clefts, and that prelinguistic experiences of these individuals should be investigated to gain a better understanding of these skills. There have been consistent findings that the language skills of children with cleft palate are delayed or less developed than those of their peers (Broen et al., 1998). From this information, it is apparent that there is a lack of consensus among professionals about the prevalence of language disorders in the cleft population.

Morris (1962) found that there are no significant differences in communication abilities between children with cleft lips and palates and those with cleft palate only. However, children with cleft lips and palates are significantly delayed in their communication skills (Morris, 1962). Research conducted between 1956 and 1970 found delayed expressive and receptive speech and language development without concurrent problems of deafness, hearing loss, intellectual disability to be the second most commonly appearing categorical feature in children with cleft palate (Bzoch, 1979). Bzoch (1979) found these individuals to show consistent delays in expressive, but not receptive, language performance at 12, 18, 24, and 36 months. Several studies have reported delays in receptive and expressive language skills, while others have reported delays in expressive language only (Broen et al., 1998; Morris, 1962). Long and Dalston (1983) examined the comprehension abilities of one-year-olds with cleft lip and palate and discovered that when compared to their noncleft peers they did not differ in the understanding of maternal utterances, and no comprehension deficits were found at one-year of age. However, other studies focusing on early receptive language development have shown notable differences between children with a cleft, most notably children with an isolated cleft, when compared to their

noncleft peers (D'Antonio & Scherer, 2008). Philips and Harrison (1969) compared the language abilities of 137 preschool aged children with cleft palates to their noncleft peers. Participants with cleft palate in this study presented with delays in both language comprehension and language usage (Philips & Harrison, 1969). Receptive and expressive language scores of children with cleft palate were considered delayed when compared to both their chronological age and to their noncleft peers (Philips & Harrison, 1969). However, when tested in 6-month intervals, children with cleft palate demonstrated progressively higher receptive and expressive language scores, but they were still below the expected norms for their chronological age (Philips & Harrison, 1969). Spriestersbach, Darley and Morris (1958) found that on average children with cleft palate had superior receptive vocabularies compared to the expected norms. A majority of current research agrees that if delays in receptive language are present early on, they typically disappear by school age (Frederickson, Chapman, & Hardin-Jones, 2006). Monitoring of receptive language skills is recommended as the child enters through the preschool years and into adolescence, especially if there is a hearing loss present (D'Antonio & Scherer, 2008).

Studies of early expressive language development indicate that children with clefts present with delays in the onset and progression of early expressive language development prior to palatal repair (D'Antonio &Scherer, 2008). Early studies focusing on individuals with cleft palate have found these individuals to be delayed in vocabulary usage (Spriestersbach et al., 1958). Research has found that one-year-olds with cleft palate were similar to their noncleft peers in their ability to express communicative intents using gestures; however, they were less competent when employing both a gesture and a vocalization during interactions with caregivers (Long & Dalston, 1982). For infants with cleft palate, the preverbal pairing of gestures and nonspecific vocalizations maybe limited due to oral structural deficits as a result of the cleft

(Long & Dalston, 1982). Some researchers suggest that it is possible that later language deficits found in children with cleft palate can be linked to delays in the very early stages of language acquisition during which preverbal gestures are paired with nonspecific vocalizations (Morris, 1962).

There is also evidence that children with cleft lip and palate show a delay in the use of jargon, onset of first words, early expressive vocabulary development and the emergence of two-word utterances (D'Antonio & Scherer, 2008; Kuehn & Moller, 2000). These delays are attributed to limitations in these children's phonetic inventory; children with cleft often choose words based on their phonetic inventory leading to limitations in vocabulary development (D'Antonio & Scherer, 2008). Research conducted by Broen et al. (1998) suggests that differences in the cognitive ability of children with and without cleft palate are linguistically based and that differences in early language acquisition are related to hearing and velopharyngeal function. Results from this research also revealed that the performance of children with cleft palate was within the normal range, but was significantly poorer than that of their noncleft peers (Broen et al., 1998). Young children with cleft palate performed poorer on the linguistic subscales of two developmental-cognitive measures and on rate of acquisition of productive vocabulary (Broen et al., 1998). Vocabulary acquisition appeared to be about three months slower than their noncleft peers (Broen et al., 1998). However, on nonlinguistic measures children with cleft palate performed just as well as their noncleft peers (Broen et al., 1998). Foundational research from Morris (1962) also found that children with cleft palates and children with other speech and language problems tend to experience more difficulties on verbal tasks than they do on nonverbal tasks. Morris (1962) suggested that it is possible that children exhibit speech problems work harder at nonverbal tasks because for them it is both less frustrating and

more rewarding than the verbal task. As such, there are indications that children with cleft palate exhibit language deficits are at an increased risk of reading disabilities (Richman, Eliason, & Lindgren, 1988). Monitoring of language skills for the population is recommended in order to prevent the appearance language and literacy problems during the school-age years and beyond (Vallino et al., 2008).

Morris and Ozanne (2003) examined the language skills of two groups of three-year-old children with cleft lip and palate. Both groups of children were found to have receptive language within normal limits (WNL) at age two (Morris & Ozanne, 2003). However, one group exhibited delayed expressive language development, while the other was found to have normal language development at two years of age (Morris & Ozanne, 2003). The delayed expressive language group was also found to have receptive language scores that were lower than the normal language development group at age two (Morris & Ozanne, 2003). When reexamined at three-years of age, significant differences were for a range of speech and language measures (Morris & Ozanne, 2003). Expressive language difficulties were found to persist for individuals in the expressive language delay group (Morris & Ozanne, 2003). The delayed expressive language group exhibited delays in syntactic development (Morris & Ozanne, 2003). However, differences in receptive language languages did not persist to three-years of age (Morris & Ozanne, 2003). There were also no significant differences between the two groups as measured on lexical diversity using the Type Token Ratio (Morris & Ozanne, 2003). These findings led researchers to identify a subgroup of children with cleft palate present with a specific language impairment (Morris & Ozanne, 2003). These individuals exhibit delays in expressive language and continue to have delayed language and disordered phonological patterns at a later age (Morris & Ozanne, 2003). It is important that SLPs who work with this population become aware of the possibility

of language impairments, so that proper monitoring procedures can be implemented and intervention can be tailored to fit language difficulties as they arise.

**Symbolic Play and Language**

Recent research suggests that early symbolic play gestures can help identify individuals with clefts that may be at risk for later language impairment (Snyder & Scherer, 2004). Individuals with isolated cleft palate have presented with protracted delays in the levels of their symbolic play and language beyond what one would expect from their cognitive and motor delays (Snyder & Scherer, 2004). Research revealed that motor development has the potential to significantly influence a child with isolated cleft palate's ability to produce combinations of gestures (Snyder & Scherer, 2004). In addition, single play gestures produced by children with isolated palate were significantly correlated with their later language development (Snyder & Scherer, 2004). The level of the elicited single play gestures children with isolated cleft palate produced at 18 months of age was associated with later vocabulary development at 30 months and with mean length of utterance (MLU) at both 24 and 30 months of age (Snyder & Scherer, 2004). This information has lead researchers to suggest that play assessment at 18 months of age might reliably identify those toddlers in need of early language intervention (Snyder & Scherer, 2004).

**Mean Length of Utterance and Verbal Output**

In addition to delays in the appearance of first words, individuals with clefts have exhibited shorter mean length of utterance (MLU), decreased structural complexity, and decreased verbal output (Spriestersbach et al., 1958; Morris, 1962). Spriestersbach, Darley, and Morris (1958) reported that individuals with clefts demonstrated no general language disorder, but showed delays and decreased measures of verbal output, vocabulary usage, and MLU. Morris

and Ozanne (2003) indicated that both of their cleft lip and palate groups, one group exhibited delayed expressive language development, while the other was found to have normal language development at two years and three years of age, presented with decreased MLU. Although, their delayed expressive language group was the only one that presented with reduced verbal output (Morris & Ozanne, 2003). Morris and Ozanne (2003) suggested that low intelligibility levels maybe correlated with reduced syntactic skills. The delayed expressive language group exhibited low levels of intelligibility, which affected the researchers ability to transcribe utterances in the language sample (Morris & Ozanne, 2003). As a result, this may have affected the language data that was obtained for the delayed expressive language group (Morris & Ozanne, 2003).

Frederickson et al. (2006) suggested that delays in language may be a consequence of speech problems associated with clefting. In this case, children with cleft palate may not be having difficulty in acquiring language as much as they may be reducing their verbal output in an attempt to increase their intelligibility (Scherer & D'Antonio, 1995). This compensatory strategy may make these individuals appear to have a shorter MLU, less advanced grammatical skills, or poor conversational skills (Spriestersbach et al., 1958). Some studies have suggested that these deficits disappear by the time children with clefts are four to five years old, while others suggest that these deficits may persist well into the school-age years (Broen et al., 1998). However, research has revealed adults with cleft palate tend to display a shorter mean length of utterance as compared to adults with clefts (Frederickson et al., 2006). Given the inconsistencies as to when language deficits disappear for the cleft population, monitoring of language skills may be required well past the early elementary school years.

Faircloth and Faircloth (1971) proposed that there are two types of aberrant oral language in children with clefts. One type of aberrant oral language suggested is the child with a cleft who

aims for articulophonetic accuracy, and as a result reduces sentence length, word length, and sentence complexity to achieve this (Faircloth & Faircloth, 1971). The second type of aberrant oral language suggested is that children with clefts rely on language structure for intelligibility and use a wider variety of linguistic constructions (Faircloth & Faircloth, 1971). When working with this population it is important to determine whether decreased MLU, verbal output, and syntactical complexity are language or articulation based in order to provide more effective treatment.

**Conversational skills.**

Research focusing on the social and pragmatic performance of individuals with cleft lip and palate has ruled out the presence of a pragmatic deficit (D'Antonio & Scherer, 2008). However, there is evidence of deficits in some aspects of pragmatics functioning that may affect social interaction (D'Antonio & Scherer, 2004). For example, individuals with cleft lip and palate produce fewer assertive utterances in conversation and are less likely to respond adequately to comments made by caregivers (Frederickson et al., 2006). Additionally, individuals with cleft palate tend to make more topic maintaining utterances than topic extending utterances than did their noncleft peers in conversational interactions (Frederickson et al., 2006). Researchers have pointed out a relationship between speech intelligibility and conversational skills (Frederickson et al., 2006). This relationship was revealed through performance on standardized articulation tests and conversational assertiveness (Frederickson et al., 2006). Those with poorer articulation scores produced fewer assertive utterances in conversation (Frederickson et al., 2006). These findings have lead researchers to suggest that individuals with cleft lip and palate may be trying to compensate for reduced intelligibility by providing shorter and fewer responses (Frederickson et al., 2006). As a result, compensation for reduced speech intelligibility

may also be impacting language performance for children with cleft lip and palate (Frederickson et al., 2006). In order to improve the effectiveness of treatment it is important to identify whether reduced conversational assertiveness is the result of a true pragmatic deficit, compensation for reduced intelligibility, or if the client has a shy or withdrawn personality (Frederickson et al., 2006).

**Clinical Implications**

Due to the variations of communications deficits seen within the cleft populations there are many clinical implications from the findings in the current research literature. Much of the present literature calls for continued monitoring of speech, language, and hearing by SLPs in conjunction with other members of the cleft palate team in order to prevent and identify earlier language, learning, and reading disabilities during the school-years and beyond. Monitoring of individuals in the cleft population has several clinical implications. First, SLPs need to be knowledgeable of appropriate assessment and other clinical tools that can help in the identification of a language disorder in the target population. If inappropriate assessment tools are used, individuals may not be identified until a large deficit is present. Additionally, early intervention is strongly emphasized in much of the literature. In order to better provide early intervention services for members of the cleft population, SLPs need to be aware of the importance of the relationship of speech in language, and facilitating the production of speech sounds prior to palatal repair surgery. Further research is warranted in this area given that much of the available research was conducted between the late 1950s and 1970s. Several medical and technological advancements have come into place since much of the foundational research surrounding the cleft population was conducted and have greatly influenced the surgical repair and treatment of individuals with clefts.

## Conclusion

Individuals in the cleft population may have a variety of communication deficits, most well known are those in the areas of articulation and velopharyngeal inadequacy. Research conducted since the 1950s reveled that these individuals may also present with language problems. However, there are inconsistencies in the literature regarding the presence of receptive and expressive language delays and their severity. The majority of the reported findings support the presence of delayed expressive language skills in the cleft population. Additionally, current research highlights the relationship that early speech development, hearing, and velopharyngeal competence may have on later language development. Continued monitoring of speech, language, and hearing of individuals in the cleft population should be performed in order to prevent language, learning, and reading disabilities as the child ages.

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