10-15-2014 12:00 AM

Exploring Communication Apprehension and its Relationship to Communication Attitude and Socio-Communicative Functioning in Children with Velopharyngeal Insufficiency

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A thesis submitted in partial fulfillment of the requirements for the Doctor of Philosophy degree in Health and Rehabilitation Sciences

EXPLORING COMMUNICATION APPREHENSION AND ITS RELATIONSHIP TO COMMUNICATION ATTITUDE AND SOCIO-COMMUNICATIVE FUNCTIONING IN CHILDREN WITH VELOPHARYNGEAL INSUFFICIENCY

(Thesis format: Monograph)

by

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A thesis submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy

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Abstract

Myriad findings on children with velopharyngeal insufficiency (VPI) indicate the potential for this population of children to experience feelings of apprehension specific to communication and the potential for other psychological and social difficulties. The purpose of the present investigation was to explore the construct of communication apprehension (Capp) and its potential relationship to social and communicative functioning in a diverse group of children with VPI. Potential linkages between Capp and multiple socio-communicative constructs including attitude, speech satisfaction, speech and language skill, social competence, and speech severity were explored in a cohort of children with and without VPI, followed by an in-depth exploration of these interrelationships within the VPI group.

Two groups of children between the ages of 7 and 14 years participated in this cross-sectional study; 20 children who presented with VPI and 20 typically developing children without VPI. Children completed a battery of questionnaires: The Measure of Elementary Communication Apprehension (Revised) (MECA-R), the Communication Attitude Test (CAT), and the Speech Satisfaction measure (SS). In addition, parents of study participants completed the Social Competence Scale (SC) of the Home and Communication Social Behavior Scales (HCSBS), and (for parents of children with VPI), the Children's Communication Checklist-Second Edition (CCC-2). Finally, perceptual evaluations of the speech characteristics of children with VPI were also gathered.

Children with VPI reported higher Capp than did the typically developing children. Correlational analyses revealed expected relationships between Capp and social and communicative functioning for the combined cohort of children, but not so for the VPI group alone. However, significant relationships between *communication attitude (Catt)* and social-communicative constructs were identified for *both* the combined cohort data and the VPI group only data. Unexpectedly, results of the present study found that Catt, rather than Capp, was more strongly related to the functional abilities examined for both the combined cohort of children and children with VPI alone. Results of the present study suggest the presence of great variability in the social and communicative functioning of children with VPI. As such,

comprehensive, yet individualized clinical assessments of social and communicative profiles of children with VPI should be sought in this clinical population.

Keywords

velopharyngeal insufficiency (VPI), velopharyngeal dysfunction, cleft lip and/or palate (CL/P), communication apprehension, communication, social competence, social function, Catt, speech satisfaction, children, adolescents, speech severity, auditory-perceptual assessment

Acknowledgments

I am indebted to many individuals who have made important contributions to the preparation and completion of the thesis. It is my great pleasure to acknowledge them here.

First and foremost, I would like to express my sincere gratitude to my supervisors, Drs. Philip Doyle and Elizabeth Skarakis-Doyle. Thank you for all of the guidance you have provided me with throughout my PhD work. It has been a long journey, but well worth it. Your continuous encouragement, support, and thought-provoking feedback culminated in a piece of work that I am a proud of. I am truly indebted to the both of you for all your contributions.

I would like to thank Drs. Murad Husein and Allyson Dykstra. I appreciate your contributions as members of my advisory committee and for providing me with invaluable expertise into this clinical population.

In addition, I wish to extend a heartfelt thank you to all of the individuals at Victoria Hospital and Thames Valley Children's centre who have welcomed me and supported my research endeavors. Thank you to Anne Dworschak-Stokan for all your efforts in recruiting study participants. I would also like to thank Kelly Rushton and Tina Brown for your contributions to this project.

I would also like to acknowledge my family. Thank you to my parents for having faith in me throughout this difficult journey. To my siblings: Andzelika, Diana, Joanna, Tom and Daniel. Thank you for your continued support throughout this long process.

Finally, I wish to thank Zaya Warda. From the bottom of my heart, I thank you for your unwavering love, support, and patience. Thank you for picking me up, when I was ready to give up. Your unconditional love and motivation went a long way in allowing me to complete this milestone in my life.

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Chapter 1

1 Introduction

Velopharyngeal insufficiency (VPI) is a speech disorder that is associated with physiologic dysfunction in the coordinated movement of the velum (soft palate) and the posterior and lateral pharyngeal walls, or what is commonly termed the velopharyngeal port (Conley, Gosain, Marks, & Larson, 1997). Children with VPI experience improper closure of the velopharyngeal port during various phases of speech production, causing air to inadvertently escape through the nasal cavity. As a result of a dysfunctional velopharyngeal valve, individuals with VPI exhibit various impairments in speech including the presence of hypernasality, nasal air emission, weak or omitted consonants and short utterance length (Kummer, 2002, 2011a). These limitations in speech production are frequently noticeable to the listener, which then calls attention to the individual speaker. As described by Van Riper (1972), "speech is defective when it deviates so far from the speech of other people that it calls attention to itself, interferes with communication, or causes its possessor to be maladjusted" (p. 29). Thus, individuals with VPI may not only be socially devalued, but also may respond to the negative reaction of listeners by limiting their own opportunities to communicate or by becoming anxious or apprehensive in anticipation of speaking. In this context, the construct of communication apprehension (Capp), which is defined as "an individual's level of fear or anxiety associated with either real or anticipated communication with another person or persons" (McCroskey, 1977, p. 78), may characterize the latter.

Individuals who are highly apprehensive about their communication will experience distress and feelings of anxiety during communicative interactions with another person or group of people (McCroskey, 1977). Although Capp is a multi-faceted construct, the net effects of such restrictions are likely to represent variable levels of anxiety and in some instances fear, when one is confronted with certain communication situations. Research suggests that high levels of Capp are frequently associated with considerable limitations in functioning for some individuals, significantly disrupting an individual's life on both personal and social levels (McCroskey, 1977; McCroskey & Richmond, 1979). As such,

broad domains related to the social and communicative functioning of an individual, such as the achievement of social competence and communication/language abilities, are likely associated with the Capp experiences of individuals. As a result, Capp may be related to multiple aspects of one's overall communicative functioning.

It is clear that a variety of voice and/or speech disorders, including VPI, may result in changes in one's ability (or desire) to involve themselves fully in communication situations. Although some individuals may not find difficulty in meeting their communication demands, others find such demands paralyzing, leading to avoidance behaviours or changes in one's lifestyle in an attempt to limit potential situations of anxiety and apprehension secondary to communication demand. While higher levels of Capp may be experienced by those who exhibit communication disorders, regardless of age, middle school children and adolescents may be particularly penalized as this developmental period is characterized by self-consciousness and the desire to achieve social acceptance by peers (Berk, 2003). Thus, concerns about the influence of Capp in middle childhood and adolescence hold promise from the standpoint of investigation of children who exhibit VPI. In addition, this internalized experience of speech anxiety may be strongly related to a child's subjective feelings towards their speech. Thus, the propensity to exhibit more relatively positive or negative attitudes towards communicating may be linked to the Capp experiences of children with VPI.

Overall, individuals diagnosed with VPI may experience limitations in a variety of areas of functioning that extend beyond the primary physical dysfunction of the velopharyngeal port. Although the physical difficulties associated with VPI have received primary attention both in research and intervention, at present, a comprehensive understanding of the social and communicative functioning of these individuals is limited (Baylis, Munson, & Moller, 2008; Chegar, Shprintzen, Curtis, & Tatum, 2007; Conley et al., 1997; Dzioba, Husein, Dworschak-Stokan, & Doyle, 2012; Havstam, Sandberg, & Lohmander, 2011; Kataoka, Warren, Zajac, Mayo, & Lutz, 2001; Kummer, 2002; Meek, Coert, Hofer, Gourhuis-Broower, & Nicolai, 2003). Hence, exploration of the social and communicative profiles of children with VPI, particularly in regard to their Capp experiences, warrants further investigation. The subsequent sections of this chapter will

address: 1) a comprehensive description of VPI from a physical/physiological perspective, including its etiology, the heterogeneity of the VPI population, and the current state of the literature on VPI; 2) the multifaceted construct of Capp from a theoretical stance, including exploration of the phenomenon in children with VPI and other communication disorders; and, 3) psychosocial constructs that may be related to Capp in children with VPI including: Catt and social competence.

1.1 The Velopharyngeal System

Briefly, velopharyngeal insufficiency (VPI) is a speech disorder associated with a dysfunctional velopharyngeal system. The velopharyngeal system consists of a muscular valve that includes the velum (soft palate), posterior pharyngeal wall and lateral pharyngeal walls (Conley et al., 1997; Kummer, 2002). The velopharyngeal valve provides separation between the oral cavity and the nasal cavity during various processes including speech production and swallowing (Perry, 2011). The process of velopharyngeal closure requires that the velum moves from its resting position in a posterior-superior direction until it makes complete contact with the posterior and lateral pharyngeal walls (Kummer, 2002). Medial movement of the lateral pharyngeal walls and anterior displacement of the posterior pharyngeal wall may also contribute to velopharyngeal closure (Ferrand & Bloom, 1997; Willging & Kummer, 1999). Efficient closure of the velopharyngeal port allows sufficient amount of air pressure to be redirected anteriorly to the oral cavity to achieve normal speech sound production (Ferrand & Bloom, 1997). If closure of the velopharyngeal system is incomplete, it will result in abnormal leakage of air into the nasal cavity, causing a speech-resonance disorder called velopharyngeal insufficiency (VPI).

1.2 Etiology of Velopharyngeal Insufficiency

Dysfunction of the velopharyngeal valve may occur for a variety of reasons and are classified in the literature based on etiology (Conley et al., 1997). Categories of classification of pathogenic mechanisms of the velopharyngeal port include: structural, functional, and dynamic origins (Conley et al., 1997; Minami, Kaplan, Wu, & Jobe, 1975). Structural manifestations of velopharyngeal dysfunction attribute the primary

defect to an anatomic abnormality. Examples include the presence of a short soft palate, deep nasopharynx, overt clefting, or other anatomic abnormality (Kummer, 2011b).

Although many etiologies of VPI have been reported in the literature, the overwhelming majority of causes are structural in nature (Conley et al., 1997) (Figure 1). The most common structural deficits of the velopharyngeal port are associated with *in utero* developmental anomalies of cleft lip and palate (CLP), submucous cleft palate (SMCP), genetic anomalies (i.e., syndromes) and Pierre Robin sequence (PRS); an individual with VPI may present with one of these conditions (i.e., CLP, SMCP, syndromes, PRS) or a combination of them (see Figure 1). Each of these conditions and their association with the development of VPI will be described below.

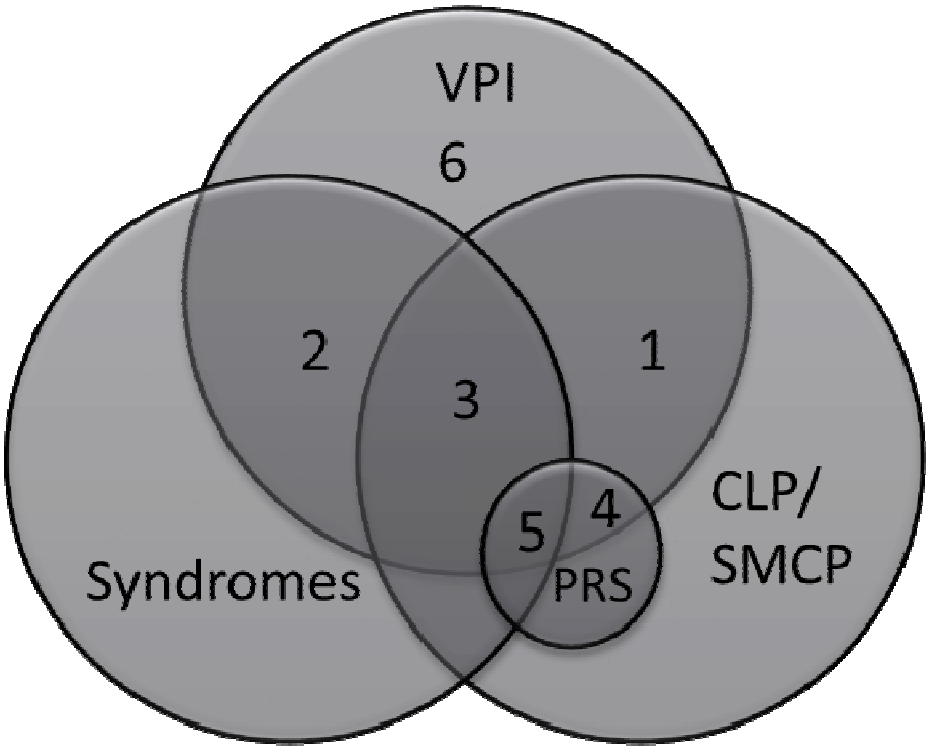

Figure 1. The etiological composition of children with velopharyngeal insufficiency. VPI = velopharyngeal insufficiency; CLP = cleft palate or cleft lip and palate; SMCP = submucous cleft palate; PRS = Pierre Robin Sequence[1]

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[1] 1= VPI associated with nonsyndromic clefting (cleft palate, cleft lip and palate, or submucous cleft palate) - represents majority of VPI population; 2 = VPI associated with syndrome [e.g., Velocardiofacial syndrome (VCFS), Treacher Collins syndrome, etc.] but no evidence of clefting - represents very small portion of VPI population; 3 = VPI associated with syndromic clefting (cases where children have a CLP/SMCP and a syndrome such as VCFS) - represents a relatively large portion of VPI population; 4 = VPI associated with nonsyndromic Pierre Robin Sequence [i.e., triad of micrognathia, glossoptosis, and clefting] but no genetic anomaly present; 5 = VPI associated with syndromic Pierre Robin Sequence (i.e., triad in 4 above present in addition to genetic anomaly); 6 = VPI associated with other functional, structural, or dynamic causes not described in 1-5 above (e.g., due to mimicry, hearing loss, post-adenoidectomy, presence of short palate, deep pharynx, palatal paresis, etc.) - represent small portion of VPI population.

1.2.1 Cleft lip and/or Palate

Cleft lip and/or palate (CLP) is by far the most common cause of VPI (Conley et al., 1997; Phua & de Chalain, 2008). Occurring at a rate of roughly 1 in 600 newborns, CLP represents the most common congenital anomaly worldwide (Nopoulos, Langbehn, Canady, Magnotta, & Richman, 2007). Oral clefts are developmental abnormalities that result from failure of neural crest cells to migrate properly during embryogenesis (Nopoulos et al., 2007). Different types of orofacial clefts may result, including cleft lip only, cleft palate only, or both (i.e., cleft lip and palate); these clefts may be complete or incomplete, and may be unilateral or bilateral in their presentation (Ferrand & Bloom, 1997). Although the majority of clefting disorders are isolated anomalies (i.e., not syndrome related), 30 percent occur as part of a genetic abnormality (Jones, 1988; Nopoulos et al., 2007). Between 20 to 50 percent of those with CLP, both before and after repair, present with VPI (see Figure 1) (Inman, Thomas, Hodgkinson, & Reid, 2005; Phua & de Chalain, 2008; Willging & Kummer, 1999). In these cases, VPI occurs as a result of inadequate muscle structure and function or insufficient velar length (Kummer, 20011b; Willging & Kummer, 1999).

1.2.2 Submucous Cleft Palate

The submucous cleft palate (SMCP) is a cleft palate subgroup that occurs in approximately 1 in 1250 to 1 in 6000 individuals (Gosain, Conley, Marks, & Larson, 1996). Approximately 17% of SMCPs are associated with genetic syndromes (Reiter, Haase, & Brosch, 2010). Rates of VPI in SMCP populations have been reported to be between 10-50 percent (Figure 1) (Abdel-Aziz, El-Hoshy, Naquib, & Talaat, 2012; Garcia-Velasco, Ysunza, Hernandez, & Marquez, 1988; Weatherley-White, Sakura, Brenner, Stewart, & Ott, 1972). SMCPs occur as a result of inadequate medial fusion of the muscles of the soft palate and incomplete fusion of the palatal shelves during embryonic development (Reiter, Brosch, Wefel, Schlomer, & Haase, 2011). SMCP is characterized by a triad of: 1) a bifid uvula; 2) a translucent zone along the midline of the soft palate attributed to separation of velar muscles; and, 3) a notch in the posterior margin of the hard palate as a result of absence of the posterior nasal spine (Calnan,

1953; Reiter et al., 2011). The underlying abnormality contributing to the presentation of VPI is muscle malposition. In this clinical population, the levator veli palatini and other palatal muscles are abnormally inserted onto the hard palate, resulting in abnormal activity of the velum (Abdel-Aziz et al., 2012).

1.2.3 Syndromes

Some children present with VPI in association with a genetically identified syndrome such as Van der Woude syndrome, Stickler syndrome, Treacher Collins syndrome, or Velocardiofacial syndrome (VCFS) (Golding-Kushner, 1997). VCFS is the most common syndrome associated with VPI (Ysunza, Pamplona, & Morales, 2011), affecting 1 in 4000 live births (Tezenas et al., 1996). Individuals with VCFS present with a microdeletion of chromosome 22 at band q11.2 (Scambler et al., 1992). VCFS is a multiple anomaly syndrome with over 180 clinical phenotypes identified in the literature including cleft palate, VPI, abnormal facial features, and cognitive delay (de Almeida et al., 2009; Robin & Shprintzen, 2005).

VCFS is present in 5-8% of children with CLP/SMCP (Rottgers et al., 2011; Ysunza, Pamplona, Molina, & Hernandez, 2009). Although individuals with VCFS may present with any variation of CLP/SMCP (Figure 1), the most common presentation is VPI due to SMCP and a hypodynamic (i.e., decreased movement) or akinetic (i.e., lack of movement) velopharyngeal mechanism (Rottgers et al., 2011). This clinical profile is difficult to treat, with speech outcomes that are markedly inferior compared with nonsyndromic children with SMCP and VPI (Rottgers et al., 2011; Widdershoen, Stubenitsky, Breugem & MinkvanderMolen, 2008).

Although uncommon, reports have indicated that VPI secondary to VCFS may also be present in the absence of a cleft (Ysunza et al., 2011) (Figure 1). Over 70 percent of individuals with VCFS present with VPI (Ysunza et al., 2011), with several factors contributing to the high frequency of VPI in VCFS including platybasia (abnormal flattening of the skull base), small adenoids, large tonsils, hypotonia (low muscle tone), congenital shortening of velar muscles and abnormalities of pharyngeal muscles (Shprintzen, 2008; Ysunza et al., 2009, 2011). Consequently, multiple anatomic and

physiologic impairments of the velopharyngeal system may cause VPI in individuals with VCFS.

1.2.4 Pierre Robin Sequence

Pierre Robin Sequence (PRS) is present in a subset of children with CLP/SMCP (Figure 1). PRS is a developmental disorder characterized by a constellation of micrognathia (abnormally small/retracted mandible), glossoptosis (downward displacement/retraction of the tongue), and cleft palate (Goudy, Ingraham & Canady, 2011; Holder-Espinasse et al., 2001). First described by Robin in 1923, the phenotypic presentation of PRS is believed to represent a sequence of events thought to be initiated by mandibular undergrowth/retropositioning during embryogenesis (Carey, Fineman, & Ziter, 1982; Patel, Sullivan, Murthy, Marrinan, & Mulliken, 2012; Shprintzen, 1992). Hence, during craniofacial development, mandibular retraction causes a downward displacement and retraction of the tongue; this event then leads to an obstruction during fusion of the palatal processes, resulting in the formation of a cleft palate (Patel et al., 2012).

PRS may or may not be associated with a syndrome (Figure 1). The incidence of VPI in children with PRS has been reported to range between 15 and 44% (Goudy et al., 2011; Witt, Myckatyn, Marsch, Grames, & Dowton, 1997), with authors reporting higher incidence of VPI in syndromic PRS compared with nonsyndromic PRS (Patel et al., 2012).

Overall, a variety of etiologies may contribute to the manifestation of VPI, whether they are structural, functional, or dynamic in nature. As such, children with VPI represent a highly heterogeneous group of individuals. Regardless of etiology, VPI is associated with a variety of impairments and limitations in communication skills.

1.3 Communication Skills of Children with Velopharyngeal Insufficiency

Good communication skills in children are imperative for adequate social development and psychosocial wellbeing. Psychosocial correlates of poor communication skills

include difficulties initiating interactions with peers (Brinton & Fujiki, 2005) and hence, forming social relationships (Nathan, 2002). In addition to psychosocial functioning, communication deficits are also related to an individual's school functioning. For example, communication deficits in children have been associated with difficulties in acquiring literacy skills (Nathan, 2002). As such, the implications of inadequate communicative functioning are multifold.

Examination of communication skills in children typically focus on the formal aspects of speech and language including phonology, general intelligibility, language structure, expression and comprehension, vocabulary, with less attention to functional language use or pragmatics (Bishop, 1998, 2003; Bishop & Norbury, 2005; Helland, Biringer, Helland, & Heiman, 2009). Similarly, for children with VPI, speech and voice functions and formal linguistic aspects of communicative skill have been examined most fully, with less emphasis on language use or pragmatics.

1.3.1 Speech Characteristics Associated with Velopharyngeal Insufficiency

Individuals diagnosed with VPI often exhibit characteristic abnormalities in their speech and/or resonance as a result of inadequate closure of the velopharyngeal port. Abnormal speech characteristics are cited throughout the literature and include: hypernasality, hyponasality, audible nasal air emission, weak or omitted consonants, short utterance length, and compensatory articulation patterns (Conley et al., 1997; Kummer, 2001, 2011a), with considerable variability across individuals. Hypernasality is the primary speech characteristic associated with VPI and occurs when there is an abnormal proportion of sound energy in the nasal cavity during speech production (Kummer, 2011a). As a result, hypernasality has a clear influence on speech and frequently results in negative changes and reductions in the intelligibility and quality of the speech signal (Kummer, 2002). Hypernasality is particularly evident on vowel sounds and during the production of connected speech (Kummer, 2002, 2011a). When hypernasality is severe, oral sounds are degraded and may be perceived as nasal sounds (Willging & Kummer, 1999).

In contrast to hypernasality, hyponasality or denasality is observed when decreased or insufficient nasal resonance occurs during nasal consonant production (Henningsson et al., 2008). When hyponasality is severe, nasal consonants (m, n, ng) sound as if they are substituted with oral phonemes (b, d, g) (Willging & Kummer, 1999). Hyponasality may be caused by a variety of factors that obstruct the nasopharynx or nasal cavity such as enlarged adenoids, the common cold, a deviated septum, or a midface deficiency (Willging & Kummer, 1999).

When a significant leak occurs in the velopharyngeal port, audible nasal air escape also may occur during the production of high pressure sounds such as plosives, or during fricatives and affricates (Kummer, 2001, 2002). A gap in the velopharyngeal port during speech production may result in considerable nasal air emission that is audible to the listener. These nasal air emissions may be heard in the form of turbulence or a nasal rustle (Kummer, 2002; Kummer, Curtis, Wiggs, Lee, & Strife, 1992). Furthermore, with higher volumes of air moving through the nasal cavity, a nasal snort may occur during consonant production (Kummer, 2002).

Weak or omitted consonants may occur due to leakage of air pressure through the velopharyngeal valve (Kummer, 2002). Air leakage through the velopharyngeal valve during production of high pressure consonants may result in a reduced amount of intraoral air pressure required for adequate production of oral sounds, resulting in consonants that are weaker in intensity or completely omitted (Willging & Kummer, 1999). This reduction may then transfer to the general efficiency of speech and its overall intelligibility.

Short utterance length may also occur in individuals with VPI. Nasal air escape will result in loss of aerodynamic support for speech (Willging & Kummer, 1999). Consequently, adequate buildup of intraoral air pressure for the production of connected speech will require increased respiratory effort of the individual to compensate for this abnormally rapid depletion of air support.

Finally, compensatory articulation patterns may also be evidenced in children with VPI (Henningsson et al., 2008; Kummer, 2011a). When intraoral air pressure is lost due to

nasal air escape, individuals may develop compensatory articulation behaviors for the production of target speech sounds; that is, the place and manner of articulation is altered to compensate for a dysfunctional velopharyngeal valve (Willging & Kummer, 1999). Compensatory articulation is often employed in an attempt to mask the sound of nasal air emission (Kummer, 2002).

In summary, individuals with VPI may present with various speech characteristics including hypernasality, hyponasality, audible nasal emission, weak or omitted consonants, and compensatory articulation all of which may diminish overall communicative functioning. In addition to the presence of these communication difficulties, decrements in linguistic aspects of communicative functioning have also been identified in children with VPI.

1.3.2 Characteristics of Language and Language Use in Children with Velopharyngeal Insufficiency

In contrast to the literature describing speech and voice impairments, language impairments have been studied to a lesser extent in children with VPI. Specifically, aspects of language and language use have been explored in two clinical disorders associated with VPI, children with CLP and children with VCFS. Studies on children with CLP often point to deficits in varied aspects of language skill including sentence formulation difficulties (Broen, Devers, Doyle, Prouty, & Moller, 1998; Conrad, Richman, Nopoulos & Dailey, 2009; Richman, McCoy, Conrad & Nopoulos, 2012), decrements in verbal memory (Conrad et al., 2009), receptive language difficulties (Broen et al., 1998), poorer scores on tests of expressive language (vocabulary, syntax) (Sherer & D'Antonio, 1995), delays in acquisition of words (Broen et al., 1998; Sherer & D'Antonio, 1995), and, comprehension difficulties (Lockhart, 2003), whereas no differences in nonverbal communication have been identified (Adachi, Kochi, & Yamaguchi, 2003; Broen et al., 1998; Long & Dalston, 1982). For example, Conrad et al. (2009) evaluated the neuropsychological functioning of children aged 7 to 17 years with non-syndromic CLP and typically developing children. Results indicated that children with CLP, on average, exhibited more deficits in vocabulary access (i.e., rapid

verbal labeling of colors and objects, picture recognition, word recall) and memory skills (i.e., sentence repetition) compared with controls (Conrad et al., 2009). Hence, multiple aspects of language deficits may be present in some children with CLP, and by extension, VPI.

For children diagnosed with VCFS, impairments encompassing multiple aspects of language structure and use are common (D'Antonio, Scherer, Miller, Kalbfleish, & Bartley, 2001; Gerdes et al., 1999; Ousley, Rockers, Dell, Coleman, & Cubells, 2007). Late onset verbal speech, receptive and expressive language delay, poor verbal fluency, and minimal changes in facial expression during communication encounters have been reported (Gerdes et al., 1999; Ousley et al., 2007). For example, approximately 62% of children with VCFS were not using words when evaluated at 24 months of age and up to 53% of toddlers and preschoolers exhibited significant expressive language delays on standardized assessments (Ousley et al., 2007).

Thus, two clinical populations which comprise a large proportion of children with VPI demonstrate not only decrements in speech (i.e., hypernasality, compensatory articulation, etc.) but also in the content and form of their language, all which may have a negative impact on communicative functioning. However, to fully understand the functional consequences of such communication difficulties in children with VPI a broader view of communicative functioning is needed.

Bishop (1998) provides a more comprehensive description of communication skills in children, encompassing aspects of language structure, function, and *use*, including "speech, syntax, semantics, coherence, initiation, stereotyped language, use of context, and nonverbal communication" (p. 34). According to Bishop's description of communication skills, the use of language in context or pragmatics is also important to consider when evaluating communicative abilities. This is also true for those with VPI. Frederickson, Chapman, and Hardin-Jones (2006) evaluated the conversational skills of preschool children with CLP compared to age-matched controls. Results indicated that children with CLP produced "fewer assertive utterances, were less likely to respond adequately to comments by caregivers, and produced more topic maintaining and fewer

topic extending utterances than did their noncleft peers during conversational interactions" (Frederickson et al., 2006, p. 179). Murray et al. (2010) examined the communication skills of children with CLP using Bishop's paradigm. They found that those children scored significantly worse in structural language, pragmatic skills and overall communicative abilities than typically developing children. Furthermore, relationships between overall communication abilities and socio-emotional functioning (via teacher ratings of child's socio-emotional functioning, observer ratings of child during recess play with peers and during doll play) of children with CLP were also identified (Murray et al., 2010). Examination of communication behaviors from this broader and more functional perspective reflects current more contemporary emphasis on the 'whole individual' with communication difficulties (Nathan, 2002) and the impact of those difficulties on their daily lives and not just on speech or language behaviors.

Decrements in communicative functioning clearly have the potential to affect the social competence of children (Ketelaars, Cuperus, Jansonius, & Verhoeven, 2010). Research suggests that abnormal speech characteristics associated with VPI are perceptible to inexperienced listeners (Blood & Hyman, 1977; Watterson, Mancini, Brancamp, & Lewis, 2013), having the potential for individuals with VPI to be socially devalued. Further, Murray et al. (2010) have shown that difficulties in language use also have the potential for social difficulties. As a result, one's social interaction may be affected with varied levels of restriction and/or apprehension in specific communicative situations. These broader conceptualizations of VPI, taking into account the complexity of the speech disorder, the language impairments and its impact on areas of functioning that extend beyond physical status are starting to receive increased recognition in the literature (Dzioba, Skarakis-Doyle, Doyle, Campbell & Dykstra, 2013).

1.4 Moving Beyond the Physical: Exploring Psychosocial Functioning in Children with Velopharyngeal Insufficiency

Literature on children with VPI often focuses on the success of interventions (i.e., surgery and/or speech therapy) aimed at remediating the physical disorder and its associated impairments in speech and linguistic aspects of communicative function. The primary

goal of intervention for VPI is the attainment of normal or more "acceptable" speech functions (Kummer, Clark, Redle, Thomsen, & Billmire, 2012). In many instances, evaluation of speech is achieved through quantitative instrumental measures such as nasometry, pressure/flow measures, and endoscopy, in addition to employing subjective auditory-perceptual measures of speech (Conley et al., 1997; Kummer et al., 2012; Van Demark et al., 1985). Although these instruments provide valuable information relative to the physical status of individuals with VPI, they often do not consider the larger impact the disorder has on broader aspects of communication performance and social functioning. Although research efforts have almost exclusively explored the physical functioning of this clinical population, a few exceptions are recent studies evaluating quality of life (QOL) issues and work assessing the social acceptance of speech in children with VPI (Barr, Thibeault, Muntz, & De Serres, 2007; Skirko, Weaver, Perkins, Kinter, & Sie, 2012; Watterson et al., 2013).

Barr et al. (2007) developed the Velopharyngeal Insufficiency Quality of Life (VPIQL) inventory to evaluate how quality of life (QOL) is affected in children with VPI. Twenty-nine children aged 5 to 17 years with VPI and their parents, and 29 control children matched on age and gender and their parents, completed the VPIQL and a generic QOL instrument entitled the Pediatric Quality of Life Inventory (PedsQL). Results of the study indicated that parents and children reported worse overall QOL on both instruments (VPIQL and PedsQL) and poorer QOL scores in each domain of the VPIQL (i.e., speech, swallowing, situational and emotional difficulty, activity limitations, and perception of the patient by others) compared with controls. As such, multiple areas of functioning may be affected in children with VPI as a result of a speech disorder that is characterized by VPI. Results of the study by Barr et al. (2007) were confirmed in a recent study using a modified, shorter version, of the VPIQL entitled the VELO (Skirko et al., 2012). In the Skirko et al. (2012) study, children aged 5 to 17 years with VPI reported more difficulties in overall QOL scores and all domains of the VELO including: speech, swallowing, situational difficulties, emotional impact, and perception of others, compared with normal speaking controls (Skirko et al., 2012). These studies (i.e., Barr et al., 2007; Skirko et al., 2012) suggest that important functional abilities beyond solely the physical status of the individual need to be considered.

Recently, Watterson et al. (2013) evaluated the ability of 44 normal speaking children aged 8 to 11 years to perceptually evaluate the presence of nasality ("not at all nasal", "somewhat nasal", or "very nasal") while listening to voice samples of peers producing varying degrees of hypernasality. Listeners rated the severity of hypernasality in speakers and rated the degree of social acceptance of the speakers on five parameters: being a good partner, "fitting in" with friends, being teased, making friends, and, getting good grades. A negative correlation was identified between peer perceptions of hypernasality and social acceptance values with children with severe hypernasality being evaluated most negatively on all ratings of social acceptance (Watterson et al., 2013). As such, the potential for stigma to be experienced by children with VPI is evident. Because children with VPI may be evaluated more negatively by their peers, they may internalize these negative appraisals, and in turn, experience feelings of discomfort during communication situations. As such, uneasiness towards communicating orally with others may develop in children with VPI (Dzioba et al., 2012) which may then interact with their social functioning.

Ultimately, the aforementioned studies (Barr et al., 2007; Skirko et al., 2012; Watterson et al., 2013) suggest that a broader perspective of disability and health, taking into consideration the psychosocial functioning of children with VPI, is warranted (Dzioba et al., 2013). To further illustrate this point, a large body of work has been conducted on the psychosocial functioning of children with cleft lip and/or palate (CLP). Because the majority of children with VPI do present with some form of clefting (i.e., CLP or SMCP), research on the psychosocial functioning of children with CLP is likely to be relevant to the VPI population (see Figure 1).

Research on children with CLP suggests that limitations in social and communicative functioning may be present in this population of children, with considerable individual variability (Kapp-Simon, Simon, & Kristovich, 1992; Murray et al., 2010). Variability in comorbidities such as hearing impairments, ear infections, genetic anomalies, observable facial disfigurement, cognitive and language development, and social and communicative abilities suggest that VPI/CLP is a highly heterogeneous group of individuals (Havkin, Tatum, & Shprintzen, 2000; Hocevar-Boltezar, Jarc, & Kozelj, 2006; Kapp-Simon &

Krueckeberg, 2000; Richman, Homes, & Eliason, 1985; Rudnick & Sie, 2008; Sheahan, Miller, Earley, Sheahan, & Blayney, 2004). Several literature reviews on the psychosocial functioning of children with VPI/CLP (Collett & Speltz, 2007; Dzioba et al., 2013; Lockhart, 2003; Richman et al., 2012; Zeytinoglu & Davey, 2012) suggest that decrements in multiple areas of functioning including social difficulties, behavioral problems, academic difficulties and psychological impairments (e.g., anxiety, low self-esteem, etc.) may be experienced in children with VPI/CLP. Furthermore, a correlation between communication difficulties and social function has been recognized in children with CLP (Murray et al., 2010).

Murray et al. (2010) assessed the relationship between communication skills and social functioning in 7-year-old children (those with CLP and controls). Children with CLP as a group displayed more communication difficulties [reflected by lower total scores on the Children's Communication Checklist –Second Edition (CCC-2)] than the control group (Murray et al., 2010). Furthermore, significant associations between communication difficulties (i.e., scores on the CCC-2) and aspects of social competence (via subscale scores of teacher-rated measure of socio-emotional functioning) were identified in children with CLP, including moderate negative relationships to social problems and withdrawn-depressed behavior suggesting increases in social difficulties with poorer communication skills (Murray et al., 2010). In sum, an association between communication deficit and social function has been identified in the literature. As such, further investigation of communication skills and its potential correlates (i.e., components of social functioning) in children with VPI is warranted.

Taken together, children with VPI may experience decrements in psychosocial functioning (Dzioba et al., 2013). These difficulties in psychosocial functioning may be associated with limitations in social functioning, communicative abilities, in addition to perceptible impairments in speech functions evidenced in children with VPI. Children with VPI are perceptually evaluated by a Speech-Language Pathologist (SLP) on degree (mild to severe) of hypernasality, in addition to other speech characteristics associated with VPI (see section 1.3.1). These abnormalities in speech are likely not only perceptible to a trained listener, but also to inexperienced listeners such as family

members, peers, and lay persons in society (Blood & Hyman, 1977; Watterson et al., 2013). Because of the atypical nature of these errors, the psychosocial experiences of children with VPI also may be affected. Similarly, the perception of abnormal speech in children with VPI may also be intricately related to additional deficits in communication, namely, in the experience of Capp. The concept of Capp and its implications will be addressed in the following section.

1.5 Communication Apprehension (Capp)

Capp was first introduced by McCroskey (1970) who defined this term as: "an individual's level of fear or anxiety associated with either real or anticipated communication with another person or persons" (cited in McCroskey, 1977, p. 78). Individuals who are "apprehensive" about their communication will consequently experience distress and feelings of anxiety when placed into a variety of social situations such as talking to authority figures, presenting a speech in front of an audience, or even in dyadic interactions. As a construct, Capp primarily focuses on an individual's internalized experience of distress in response to communicative tasks and demands. Therefore, research has been directed toward the perceived feelings of fear and anxiety that accompany those communication situations (McCroskey, 1977). Although Capp correlates to some degree with physiological measures [e.g., blood pressure, heart rate (Wheeless, 1971)], and overt behaviour [e.g., social withdrawal, avoidance (Daly & McCroskey, 1984)], it is the internal response that is of central focus in the construct of Capp. These feelings of apprehension are relatively enduring, occurring across a wide variety of speaking contexts over long periods of time (Daly & McCroskey, 1984) and over a continuum of severity from low to high (McCroskey, 1978). The manifestation of these feelings of Capp has been described from multiple theoretical standpoints.

1.5.1 Theoretical Perspectives on the Development of Communication Apprehension

Historically, multiple perspectives on the etiology of Capp have been posited in the scientific literature. For example, social learning theory suggests that Capp is acquired

through reinforcement and modelling within the child's environment (Daly & McCroskey, 1984). If a child is not positively reinforced for his or her communication attempts, or receives negative feedback during communication, Capp may develop. In contrast, skills acquisition theory proposes that Capp arises from inadequate communicative abilities (McCroskey, 1977). More recently, Beatty, McCroskey, & Heisel (1998) proposed a "communibiological" theory of Capp that combines research on temperament (Eysenck, 1985) and neurobiology (Gray, 1981). Beatty et al. (1998) suggested that Capp is the expression of two inborn traits, introversion and neuroticism, which are themselves expressions of neurobiological systems; hence, from this perspective Capp is biologically rather than socially determined.

Empirical support for each of the aforementioned perspectives (i.e., social learning, skills acquisition, and biological perspective) has been reported in the scientific literature (social learning perspective: Ayres, 1988; Beatty, Plax, & Kearney, 1985; skills acquisition theory: McCroskey, 1977; McCroskey, Andersen, Richmond & Wheeless, 1981; biological perspective: Opt & Loffredo, 2000; Sallinen-Kuparinen, McCroskey, & Richmond, 1991). Thus, decades of research into the etiology of Capp have provided evidence for the role that social learning, skills acquisition, and genetics all play in the development of Capp. These findings collectively suggest the etiology of Capp is likely multifaceted. The contemporary view of Capp incorporates these positions into an integrated view of Capp development (Horwitz, 2002). Indeed, a multi-causal model of Capp was proposed by Condit (2000), who suggested that many factors, including "genes, gene products, physiological and environmental inputs, developmental processes, established biological structures, cognitive processes and inputs, cultural processes, social structural inputs, and codes" contribute to Capp (p.7). This multi-causal approach to the development of Capp, emphasizing the different pathways in which Capp may develop, reflects the contemporary theoretical stance on the etiology of Capp (Horwitz, 2002). Reflecting the transition of the conceptualization of the Capp construct over the years, different methods of measuring Capp have been employed.

1.5.2 Measuring the Construct of Communication Apprehension

Several approaches to the evaluation of Capp have been advanced in the literature including the use of physiological measures (e.g., measuring arousal states such as heart rate, blood pressure, and galvanic skin response during speaking situations), observer ratings (e.g., outsider observations of social behaviors thought to be indicative of Capp such as withdrawal, social isolation, reticence, etc.), and introspective tests (e.g., self-report instruments) (Wheeless, 1971). Although all three measures of Capp have been found to be highly reliable individually, low to moderate intercorrelations among these three measures suggest that physiological measures, observer ratings and introspective tests of Capp are measuring conceptually distinct constructs (Daly & McCroskey, 1984; Wheeless, 1971). Because Capp is operationally defined as a cognitive experience of fear during communication, self-report measures are likely the most appropriate means of gathering valid and reliable information relative to the internalized experience of Capp of an individual. Hence, the introspective approach to the study of Capp has been the most widely used method of measuring Capp (McCroskey, 1978; Wheeless, 1971).

Self-report measures are designed to evaluate subjective appraisals of thoughts and feelings of an individual. Three tools have been exclusively used in Capp research, including the Personal Report of Communication Apprehension (PRCA) (McCroskey, 1978), the Personal Report of Communication Fear (PRCF) (McCroskey et al., 1981), and the Measure of Elementary Communication Apprehension (MECA) (Garrison & Garrison, 1979). The PRCA is the most widely used assessment of Capp (Booth-Butterfield, Heare, & Booth-Butterfield, 1991; Buhr, Pryor, & Sullivan, 1991; Byles, Forner, & Stemple, 1985; Richmond, McCroskey, & McCroskey, 1989; Rockwell, 2007; Sallinen-Kuparinen et al., 1991). This 24-item instrument assesses levels of speaking apprehension in four communication contexts: meetings, small groups, dyadic interactions, and public speaking (McCroskey, 1978). Although the PRCA exhibits high levels of reliability and validity, it was developed for individuals at the high school level and above (Daly & McCroskey, 1984); hence, the PRCA is not appropriate for use on younger populations of children.

Alternatively, the PRCF is a 14-item instrument developed to evaluate the Capp of children who are preliterate to the junior high school level (McCroskey et al., 1981). Although the PRCF has been found to correlate highly with the PRCA for older children and adults, many items on the PRCF are negatively phrased (e.g., "I like it when I don't have to talk"). Research suggests that younger children, particularly preliterate children, have difficulty responding to negatively worded items on self-report measures, thereby limiting the reliability of the PRCF instrument (Watson, Monroe, Fayer, & Aloise, 1988).

Finally, the MECA, a 20-item questionnaire of Capp, was developed to evaluate levels of communication anxiety in a variety of speaking situations for children in kindergarten to Grade 12 (Garrison & Garrison, 1979; Krol-Jersevic, 2004; McCroskey et al., 1981). The MECA utilizes a "faces scale" ranging from smiling to frowning faces, an appropriate scale choice for use in younger children (Garrison & Garrison, 1979). The MECA exhibits good levels of validity and reliability and has been advocated for use in evaluating Capp experiences of elementary school children (Garrison & Garrison, 1979; McCroskey, 1977), details of which will be addressed subsequently.

Evidence suggests that Capp may develop early in childhood (Garrison & Garrison, 1979; McCroskey, 1977; McCroskey et al., 1981; Wheeless, 1971). Based on scores derived from self-report inventories of Capp, studies on elementary school children report a trend for Capp experiences to increase from lower to higher grades (Comadena & Prusank, 1988; Garrison & Garrison, 1979; Hutchinson & Neuliep, 1993a; McCroskey et al., 1981). As such, on a group level, average Capp scores are reported to be lowest for children in Kindergarten (reflecting low levels of Capp), and tend to increase with advancing grade levels (reflecting increased discomfort associated with oral speaking situations). Furthermore, several studies have identified that children in grades 3 and lower reported significantly lower Capp scores compared with children in higher grades (Hoffman, 1992; Hutchinson & Neuliep, 1993a; McCroskey et al., 1981); this finding suggests that an important developmental change occurs between the 3rd and 4th grades and may be attributed to the school and social environment of children. While some increase in speaking discomfort in the elementary school years appears to be part of normal development, research indicates that between 11 and 20% of elementary students

experience Capp that is severe enough to warrant treatment (Garrison & Garrison, 1979; Hutchinson & Neuliep, 1993b; McCroskey, 1977; Wheeless, 1971). As such, Capp often points to a breadth of negative life experiences with a significant potential for limitations in psychosocial functioning.

1.5.3 Psychosocial Correlates of Communication Apprehension

Owing to its likely chronic nature, Capp may be associated with impairments and limitations in both personal and social functioning. Several relationships between Capp and psychosocial functioning of individuals who exhibit Capp have been identified in the literature. Specifically, Capp is correlated with many negative life experiences including social limitations, academic underachievement, and undesirable perceptions of others.

High levels of Capp are often associated with disruptions in many aspects of an individual's social life. Limitations in social and communicative functioning of an individual with Capp often manifest itself in the form of poor social behaviors. Individuals with Capp often exhibit withdrawal, avoidance, and communication disruption in social situations (McCroskey, 1977). Hence, during oral speaking situations, individuals with Capp are likely to exhibit withdrawal behaviors such as talking less in a small group setting (McCroskey, 1977), or avoidance behaviors such as sitting at the back and sides of the classroom where interaction is least likely to occur (Daly & McCroskey, 1984). Individuals with Capp often engage in these behaviors to limit the amount of exposure they have to speaking situations, thus preventing feelings of anxiety from developing. These patterns of social behavior may, however, negatively influence an individual's interpersonal relationships. For example, problems maintaining friendships (McCroskey & Daly, 1976) and having fewer dating partners (McCroskey & Sheahan, 1978) have also been identified in individuals with Capp.

Furthermore, difficulties in achieving academic success are also related to Capp experiences (Blue, Stratton, Donnelly, Nash, & Schwartz, 1998; McCroskey, 1977). Lower grades in junior high of individuals with Capp have been reported in the literature (McCroskey, 1977). Individuals with Capp have also been found to obtain lower scores

on school evaluation tasks involving oral communication (Bettini & Robinson, 1990; Blue et al., 1998). As such, difficulties in school functioning are common in individuals with Capp.

Finally, Capp has also been linked to the perceptions that other individuals in society (e.g., peers, teachers, etc.) have of the person with Capp. Studies indicate that persons with Capp are consistently perceived by others as being less competent and less attractive (Daly, McCroskey, & Richmond, 1977; McCroskey & Daly, 1976; McCroskey, Daly, Richmond, & Cox, 1975). For example, McCroskey and Daly (1976) conducted a study that examined the expectations that teachers had of a child with Capp compared with a child that did not exhibit communication fear. Results indicated that teachers expected the child with Capp to have lower overall academic achievement, less satisfactory relationships with other students, and less success in future educational pursuits compared with the child who was not communication apprehensive (McCroskey & Daly, 1976).

Collectively, individuals with Capp appear to experience impairments that extend from immediate disruptions in communication situations to more existential concerns that encompass one's personal, social, and academic functioning. Work on the experiences of children over the elementary and high school years have found that Capp may develop at an early age (Comadena & Prusank, 1988; Garrison & Garrison, 1979; Krol-Jersevic, 2004; McCroskey et al., 1981). Overall, literature on the relationship between Capp and psychosocial functioning highlights the multi-faceted network of disabling processes that are experienced by those with Capp.

1.5.4 Communication Apprehension in Children with Velopharyngeal Insufficiency

Research indicates that Capp affects individuals with various communication disorders (e.g., fluency disorders, dysphonia, language disorders, etc.), including children with VPI (Beitchman et al., 2001; Blood, Blood, Tellis, & Gabel, 2001; Dzioba et al., 2012; Horwitz, 2002; Scott & Beidel, 2011; van Mersbergen, Patrick, & Glaze, 2008). Dzioba

et al. (2012) evaluated the Capp experiences of 14 school-age children (age 8 -14 years) with VPI and 14 age- and gender-matched controls using the MECA. Results indicated that, on average, children with VPI reported higher scores on the MECA, reflecting higher levels of Capp when compared to controls (Dzioba et al., 2012). In fact, a 10-point difference in total Capp scores was found between the two groups, indicating that children with VPI may belong to a separate category of Capp. Similar trends were reported in a follow-up study using a sample size of 40 children (age 8 -14 years) with VPI and 40 age-matched controls, indicating higher self-reported Capp in adolescents with VPI compared with controls (Dzioba, Husein, Dworschak-Stokan, & Doyle, 2011). Furthermore, Demir, Karacetin, Baghaki, and Aydin (2011) identified a higher prevalence of social anxiety in children with CLP that was not associated with a syndrome (age 6 to 16 years) compared with controls. Although not synonymous with Capp, social anxiety is also characterized by apprehensive reactions to social situations, suggesting that some individuals with VPI (due to CLP) do present with fearful communication predispositions. Although empirical support is limited, results of the aforementioned studies (Demir et al., 2011; Dzioba et al., 2011, 2012) propose that children with VPI tend to experience a higher rate of Capp compared with typically developing children. Thus, Capp may become a part of the daily experiences of some children with VPI.

Although Capp also may be experienced by individuals without communication disorders (McCroskey, 1977), children with VPI may be at greater risk for developing Capp as a result of various decrements in functioning including their speech impairments. In fact, Demir et al. (2011) found a positive relationship between severity of speech dysfunction and social anxiety in children with CLP, in addition to other cleft-related factors, such as the severity of dental abnormalities and facial disfigurement. As such, a relationship between Capp and speech severity may exist in children with VPI. Children with VPI exhibit dysfunctions in speech and/or resonance that are frequently noticeable and judged as abnormal by the listener (Blood & Hyman, 1977) which in turn calls attention to the disorder (Van Riper, 1972) rather than to the message of the speaker. For this reason, the potential for apprehension within myriad communication situations may be observed.

For SLPs working with children with VPI, evaluating Capp may be of interest from multiple standpoints. First, Capp has been associated with disruptions in an individual's cognitive abilities, speech motor functions, and physiological states (Horwitz, 2002) and, hence, may have a significant effect on therapy outcomes (Neiman & Rubin, 1991). "Neglecting or underestimating the effects of communication apprehension on patients can lead to unsuccessful treatment of a disorder" (Horwitz, 2002, p. 22). Second, SLPs do not treat communication disorders, but rather, individuals with communication disorders, necessitating that the whole person be taken into consideration and, hence, how various areas of functioning and disability may influence treatment outcome (Horwitz, 2002). Although SLPs' primary focus of intervention for children with VPI is typically aimed at eliminating unwanted speech characteristics (i.e., hypernasality, articulation impairment, etc.) and replacing them with new patterns, the child's ease or comfort during communication encounters may not be addressed directly. Exploring the experience of Capp and its potential social and other communicative impacts in this population of children may serve to provide a more complete understanding of communicative functioning in children with VPI. Thus, a broader assessment of communicative and psychosocial functioning of children with VPI is warranted.

1.6 Unraveling the Multidimensional Construct of Capp: Exploring Psychosocial Constructs Related to Capp

Children with VPI are at risk for developing Capp (Dzioba et al., 2012). These debilitating feelings of apprehension have the potential to interact with multiple aspects of one's social and communicative functioning. Specifically, linkages between Capp and the psychosocial constructs of Catt and social competence of children with VPI may unravel how different dimensions of psychosocial functioning may interact with levels of Capp experienced in children with VPI. These constructs will be described in the following sections of the treatise.

1.6.1 Communication Attitude (Catt)

Speech-associated attitudes may influence the communicative functioning of children with VPI. Several definitions of attitude have been posited in the literature. Guitar (2006) defines attitude as "feelings that have become pervasive and part of a person's beliefs" (p. 16). Eagly and Chaiken (2007) define attitude as "one's propensity to evaluate a particular entity with some degree of favorability or unfavorability" (p. 583). Specific to children with speech disorders, attitude may be defined as "children's perceptions and feelings as they pertain to speech" (DeKort, 1997, as cited in Johannisson et al., 2009, p. 815) or "a composite of judgments about speech performance" (Ingham, 1996, p. 325). These beliefs that children with speech disorders including those with VPI have toward their speech, may interact with their cognitive processes, affective states, and behavior during communication situations (Vanryckeghem & Mukati, 2006).

The construct of Catt has primarily been studied in individuals who stutter (Brutten & Dunham, 1989). In fact, a large body of literature has found that individuals who stutter have a propensity to exhibit more negative feelings towards their speech and speaking ability, compared to normal speaking controls, with negative communication attitudes established in children as young as preschool and kindergarten (Bernardini, Vanryckeghem, Brutten, Cocco, & Zmarich, 2009; Vanryckeghem & Brutten, 1996, 2011, 2012; Vanryckeghem, Brutten, & Hernandez, 2005; Vanryckeghem & Mukati, 2006). De Nil and Brutten (1990) expanded this work by assessing the Catt of children aged 7 to 14 years with various communication disorders including those affecting voice, articulation, and fluency. Results indicated that the speech-associated attitudes of children who stuttered were comparable to children in the voice disorder group, while the Catt of children with articulation disorders did not differ to a statistically significant extent from control children without speech disorders. Children in the stuttering and voice disorder groups indicated more negative attitudes towards their speech compared with children with articulation disorders and controls (De Nil & Brutten, 1990). Hence, negative speech-associated attitudes may develop during the school-age years with a variety of speech disorders.

Havstam et al. (2011) examined the relationship between children's Catt, environmental factors reported by parents (e.g., parent satisfaction with child's speech, teasing, intelligibility with strangers, intelligibility at home, general impressions of speech), and speech status assessed by trained listeners, in fifty-four 10-year-old children with CLP. Results indicated that children with CLP exhibited more negative attitudes towards their speech on a group level compared to reference data of children without speech disorders, but with large individual variation (Havstam et al., 2011). In addition, all environmental factors correlated significantly with Catt, with correlations ranging between .33 (intelligible at home) and .65 (intelligible with strangers). Furthermore, weak to moderate, but statistically significant positive correlations between Catt and ratings of speech were found, ranging between .28 (velopharyngeal function) and .47 (general impression of speech). Results of the study suggest that the more deviant the children's speech was assessed to be, the more negative was their Catt (Havstam et al., 2011). In addition, results of Havstam et al. (2011) indicate that although a relationship between speech and Catt may exist in children with CLP, not all children with impaired speech will develop negative communication attitudes. These findings underscore the complex and individual nature of speech associated-attitudes in children with CLP/VPI. As such, there is potential for relationships between speech production, satisfaction with speech, and Catt to exist. For example, as indicated above, Havstam et al. (2011) found a moderate relationship between Catt and speech severity in 10-year-old children with CLP, with children with more severe speech difficulties indicating more negative attitudes towards speech. Hence, a more holistic perspective of speech disorders would suggest that disruptions in speech production during communicative interactions are likely not only associated with the complexity/demands of the speech task (e.g., single word tasks versus spontaneous conversational speech), but also with the thoughts and feelings the speaker has towards their speech and speaking ability (Johannisson et al., 2009; Van Riper, 1973).

In addition, an association between Catt and one's awareness of reactions to speech impairments has been identified. For individuals with speech disorders, a negative attitude towards speech is strongly linked to one's awareness of reactions to their speech, whether internally (i.e., self-awareness of speech difficulty) or externally (i.e., negative

reactions of listeners to one's speech) derived (Vanryckeghem & Brutten, 2007). For example, negative reactions of individuals in the child's environment to the child's speech abnormalities can have an adverse impact on the child's ability to communicate (Murphy, Yaruss, & Quesal, 2007). This may then increase the likelihood that speech-associated attitudes and speech ability may "mutually influence each other" (Vanryckeghem et al., 2005, p.89). Hence, negative attitudes towards one's speech may interact with decrements in one's speech production, or more broadly, one's communication performance.

In sum, the attitude that children with speech disorders, including those who exhibit VPI, have towards their speech may be related to the communicative functioning of a child from multiple standpoints, as the literature has identified multiple interrelationships between Catt, speech severity, negative emotion to speech disruptions, and one's awareness of deficits in speech. Because of the intricate relationship between cognitive, affective, and behavioral manifestations of a speech disorder (Vanryckeghem & Mukati, 2006) the propensity to exhibit more positive or negative speech-associated attitudes is likely to be related to one's feelings of comfort towards speaking situations. Hence, Catt may be strongly related to another communication construct that has a strong cognitive (and affective) component, that of communication apprehension (Capp). Because a relationship between negative attitude and negative emotions has been identified in the literature (Vanryckeghem, Hylebos, Brutten, & Peleman, 2001), it is plausible that Catt may also relate to the experience of Capp, a construct that is also characterized by negative feelings or emotions related to speech. This may be present in children with VPI who present with disordered speech. Given that Capp has been associated with both cognitive/affective and social interaction difficulties in individuals without communication impairments (McCroskey, 1977) it would also be reasonable to examine whether Capp may also interact with the social competence of children in this clinical population.

1.6.2 Social Competence

Social competence represents a multidimensional construct that has been defined most often as an individual's ability to function successfully in social situations. Hops (1983) defined social competence as "a summary term which reflects social judgment about the general quality of an individual's performance in a given situation" (p. 3). Hence, social competence is viewed as an overarching construct that encompasses specific social behaviors, but primarily emphasizes the collective social behavior profile of an individual (Merrell & Caldarella, 2002). This summative perspective of social competence/social functioning will be adopted in the present thesis. In addition to defining social competence, Hops (1983) provides a conceptual description of the relationship between social competence and two other closely related constructs, social skills, and social acceptance. Social skills and social acceptance are often conceptualized as subdomains of social competence (Gresham & Reschley, 1987; Hops, 1983). Social skills may be described as a repertoire of specific behavioral skills used in response to given situations (Gresham, 1986; Gresham & Reschly, 1987; Merrell & Caldarella, 2002); social skills may include: academic-related social skills, cooperation, and social initiation (Gresham, 1986; Stephens, 1978). Social acceptance concerns one's social status with peers (Crowe, Beauchamp, Catroppa, & Anderson, 2011; Merrell & Caldarella, 2002) and as such is more typically described as a consequence or outcome of social competence (Crowe et al., 2011; Gresham & Reschly, 1987).

Emphasizing this broader notion of social competence, Beauchamp and Anderson (2010) recently introduced a comprehensive model of how individuals function in social situations. Deriving concepts from the field of social neuroscience, Beuchamp's and Anderson's (2010) integrative model encompasses aspects of social cognition, social skills and social behaviors displayed by the individual (Beauchamp & Anderson, 2010; Crowe et al., 2011). According to the model, one's ability to function in social situations is dependent on a multitude of cognitive, emotional, linguistic, and communication skills, as well as internal and external (environmental) factors that mediate these skills (Beauchamp & Anderson, 2010). Yet cognitive impairments, behavioral disruptions, disadvantaged environments, compromised brain integrity and a personality that impedes

social interactions, can all be factors in the development of social dysfunction (Crowe et al., 2011; Harris, 2003). Collectively, these broad definitions of social competence (Beauchamp & Anderson, 2010; Hops, 1983) suggest that adequate social functioning in childhood forms a foundation for later success and psychosocial adjustment (Merrell & Caldarella, 2002).

The achievement of adequate social competence is a critical component in the formation of satisfying and lasting relationships and academic success (Cacioppo, 2002; Crowe et al., 2011; Merrell & Caldarella, 2002). The establishment of solid relationships is essential to physical and psychological welfare across the lifespan (Cacioppo, 2002; Crowe et al., 2011). In contrast, decrements in social competence may negatively affect a child's adaptation in the school, home and the community (Crowe et al., 2011; Yeates et al., 2007). Negative outcomes of inadequate social competence in childhood include delinquency, mental health problems, antisocial behavior patterns, peer rejection, and poor academic functioning (Malecki & Elliot, 1999; Merrell & Caldarella, 2002; Warnes, Sheridan, Geske, & Warnes, 2005). As such, the attainment of adequate social competence has long-term implications for the life experiences of all children, including children with speech disorders. Research evaluating various aspects of social competence in children with CLP suggests that difficulties in social competence may be present in children with VPI.

Research on children with CLP suggests that multiple components of social competence may be affected in some children with VPI/CLP (Dzioba et al., 2013). Passive/reticent communication behaviors, limited interactional behaviors, social isolation/poor peer acceptance, teasing regarding speech/facial disfigurement, academic difficulties, less friendly behaviors in social situations, and difficulty acquiring friendships have been identified in children with CLP (Berger & Dalton, 2009; Chetpakdeechit, Hallberg, Hagberg, & Mohlin, 2009; Frederickson et al., 2006; Havstam et al., 2011; Krueckeberg, Kapp-Simon, & Ribordy, 1993; Murray et al., 2010; Nash, Stengelhofen, Toombs, Brown, & Kellow, 2001; Noor & Musa, 2007; Richman & Harper, 1980; Shute, McCarthy, & Roberts, 2007; Slifer et al., 2004).

For example, a potential for social isolation and poor peer acceptance is not uncommon in those individuals who exhibit speech impairments, including children with CLP (Berger & Dalton, 2009; Chetpakdeechit et al., 2009; Nash et al., 2001). Poor peer acceptance in the form of bullying also has been evidenced in children with CLP, with reported rates of teasing regarding speech deficits ranging from 30% and 75% of children who have CLP (Havstam et al., 2011; Nash et al., 2001; Noor & Musa, 2007). As reported earlier, Frederickson et al. (2006) found that preschool children with CLP were less able to actively contribute to conversations with caregivers compared to age-matched controls. In sum, multiple facets of social functioning may be compromised in children with VPI (Dzioba et al., 2013). These limitations in overall social competence may also interact with the level of comfort a child feels during oral communication (Dzioba et al., 2012), although the directionality of influence is unclear.

According to the contemporary view of Capp, a complex reciprocal relationship exists between Capp and social competence (Condit, 2000; Horwitz, 2002). For example elevated levels of Capp may result in the desire to withdraw from social/communicative situations. If a child has less opportunity to interact and socialize with individuals, the social competence of the child may be compromised. Hence, social competence and Capp may mutually influence each other. Indeed, Capp may be associated with a multitude of psychosocial functions of children with VPI, including one's attitude towards speech, and the broader construct of social competence.

1.7 Study Rationale

Literature on children with VPI often focuses on the physical status of the individual, while areas related to psychosocial functioning are often overlooked (Conley et al., 1997; Kummer et al., 2012; Van Demark et al., 1985). Children with VPI represent a highly heterogeneous group of individuals, with the potential to experience significant reductions in speech and language skill, apprehension, attitude and social skill factors that may impact their communicative functioning and hence quality of life (Barr et al., 2007; Dzioba et al., 2013; Richman et al., 1985; Rudnick & Sie, 2008). The literature previously reviewed suggested multifaceted interactions between these social and

communicative factors in the population generally (McCroskey, 1977; McCroskey & Richmond, 1979). Hence, further investigation of the communication performance and social functioning of children with VPI is warranted.

The myriad of findings on children with VPI indicate the potential for this population of children to experience feelings of apprehension specific to communication and potential for other psychosocial difficulties. Thus, the objective of the present study is to further explore a more comprehensive understanding of the potential linkage between VPI, Capp, and multiple aspects of their psychosocial functioning (Dzioba et al., 2011, 2012). Specifically, investigating perceived Capp and the Catt of these children in addition to the satisfaction with their speech, may serve to provide a better understanding of the functioning and disability of this clinical population (Havstam et al., 2011). Thus, these subjective impressions attributed to speech dysfunction may be related to Capp experiences in children with VPI and other psychosocial factors such as social competence and communication. Hence, exploration of the interrelations between Capp and one's functional abilities in social domains and communication performance, in addition to the relationship between speech deficits and Capp experiences in children with VPI is warranted.

1.7.1 Research Questions

In order to address the previous objectives multiple research questions related to the construct of Capp and communicative functioning in children with VPI are posed. Specifically:

1) In a diverse population of children with VPI, is there a difference in the level of Capp that children with VPI experience compared with typically developing children?

2) Do relationships exist between Capp and other psychosocial constructs (i.e., Catt, speech satisfaction, and social competence)?

2a) Do relationships exist between Capp and other psychosocial constructs (i.e., Catt, speech satisfaction, communication skills, and social competence) in children with VPI?

3) Do relationships exist between communication constructs (i.e., Capp and Catt, speech satisfaction) and speech severity in children with VPI?

Chapter 2

2 Methods

2.1 Participants

Two groups of children between the ages of 7.0 and 14.0 years of age participated in this cross-sectional study; one group (n = 20) presented with velopharygeal insufficiency (VPI) and the second group (n = 20) did not exhibit VPI. The first cohort group comprised children who had been diagnosed by a board certified Pediatric Otolaryngologist and/or Speech Language Pathologist (SLP) to have VPI. Given that VPI is associated with other conditions, children with VPI comprise a heterogeneous group of individuals. To gather data from children with VPI that represented the heterogeneity that is common to this population, children with any underlying etiology associated with VPI were eligible to participate. Hence, the following inclusion and exclusion criteria were established.

2.1.1 Inclusionary and Exclusionary Criteria

Inclusionary criteria for participation in the VPI group included children with VPI related to any etiology including: children who had a genetic syndrome, children with cleft lip and/or palate, children with facial disfigurement (i.e., children with cleft lip), children with submucous cleft, children presenting with iatrogenic causes of VPI (e.g., due to adenoidectomy), palatal paresis, etc. Exclusionary criteria for children in the VPI group included presence of severe cognitive delay, and/or the presence of nasal congestion on the date of data collection. Children who were severely developmentally delayed as determined by parent report were excluded from participation because they would be unable to answer the self-report questions. Because completion of self-report measures by children was an essential component of the study protocol, it was necessary that children were potentially capable of understanding the questions posed.

In addition, children who presented with nasal congestion at the time of data collection were also excluded from the study because perceptual assessment is the gold standard for diagnosis of VPI and requires that judgments be made on characteristics related to

resonance. The presence of nasal congestion affects resonance characteristics of speech (i.e., denasality), which may in turn prevent accurate perceptual assessment of presence and severity of VPI related to speech (e.g., hypernasality, reduced articulation proficiency, etc.). As such, these children were deemed ineligible to participate in the study.

2.1.2 VPI Group

Based on these inclusion/exclusion criteria, the resulting VPI group included 20 children between the ages of 7.0 and 13.8 (M = 9 years, 1 month; SD = 1 year, 9 months). Twelve children were boys (60%) and eight were girls (40%). Children in the VPI group presented with a variety of underlying etiology associated with VPI (Table 1). Of the 20 children who comprised the VPI group, 12 exhibited some form of a cleft lip and/or palate (isolated cleft in the hard and soft palate, n = 5; unilateral cleft lip and palate, n = 3; bilateral cleft lip and palate, n = 1; submucous cleft palate, n = 3). Two children had VPI associated with velocardiofacial syndrome (VCFS), testing positive for 22q.11 microdeletion on genetic testing.

The remaining six children presented with VPI for unknown causes. In these six children there was no history of CLP, a submucous cleft palate was not detected based on examination of the oral cavity (i.e., no evidence of bifid uvula, muscular diastasis, or notch on posterior surface of hard palate), and VCFS was ruled out (genetic testing confirmed children were negative for 22q.11 microdeletion). In these six cases, VPI was present due to poor mobility of the soft palate and/or presence of a flat palate, shrinkage of the adenoid tissue, or hypertrophy of the tonsils, compromising adequate velopharyngeal function.

Seven of the children who comprised the VPI group (35%) also presented with a syndrome or other genetic abnormality. All of these children were identified by parents to exhibit language/cognitive skills that were adequate to complete the research protocol and, thus, they were not excluded from participating in the study. Five children were reported (by parents) to have a learning disability, and 2 children had some degree of hearing impairment at the time of data collection (Table 2).

Table 1

Underlying Etiology Associated with Velopharyngeal Insufficiency for Children in VPI Group

Etiology	N
Unknown	6
Isolated cleft in hard and soft palate	5
Unilateral cleft lip and palate	3
Submucous cleft palate	3
Velocardiofacial syndrome	2
Bilateral cleft lip and palate	1

Note. Unknown = cases of velopharyngeal insufficiency in which cleft lip and palate, submucous cleft, and velocardiofacial syndrome have been ruled out; VPI = velopharyngeal insufficiency.

The second group of children comprised the control group and included 20 typically developing age and sex-matched children (M = 9 years, 3 months; SD = 2 years, 0 months; range = 7.0 to 13.3) who had not been diagnosed with VPI or any other voice, speech, and/or language disorder, or any other developmental disorder. Children in the control group were identified by their parents as healthy and typically developing for their age. Demographic information for children in the VPI and control groups is provided in Table 2. No children in the control group presented with learning disabilities or hearing impairment. Prior to data collection, full ethical approval was obtained from the Research Ethics Board of the University of Western Ontario (UWO) (Appendix A) and Lawson Health Research Institute (Appendix B).

Table 2

Demographic Characteristics of Children in the VPI and Control Groups

Demographic	VPI Group (n = 20)	Control Group (n = 20)
Gender		
Male (n)	12 (60%)	12 (60%)
Female (n)	8 (40%)	8 (40%)
Mean Age in Years (Range)	9.1 (7.0 – 13.8)	9.3 (7.0 – 13.3)
Median Grade in School (Range)	3 (1 - 8)	3 (1 - 8)
Hearing		
Normal (n)	18 (90%)	20 (100%)
Impaired (n)	2 (10%)	0 (0%)
Learning		
Typical (n)	15 (75%)	20 (100%)
Disability (n)	5 (25%)	0 (0%)
English		
Primary (n)	20 (100%)	20 (100%)
Secondary (n)	0 (0%)	0 (0%)

Note. VPI = velopharyngeal insufficiency.

2.1.3 Recruitment of Participants

A routine review of the medical records of children attending the VPI clinic at Victoria Hospital was conducted by a registered SLP to identify potential participants based on study inclusion and exclusion criteria. During their regularly scheduled appointment at the VPI clinic, parents of potentially eligible children were given a brief description of the study by the attending Pediatric Otolaryngologist and asked if they would consider having their child participate. If the parent and child expressed interest, they were

introduced to the primary investigator (A.D.) who provided more detailed information about the study in a separate clinic room.

A control group of age- and sex-matched participants were recruited through regularly scheduled appointments at other Ear, Nose, and Throat (ENT) clinics at Victoria Hospital, London, Ontario. The attending Pediatric Otolaryngologist introduced the study to potential participants. Parents and children who expressed interest in the study were provided with further details about the study by A.D. in an adjacent clinic room following their appointment. In addition to this primary method of recruitment, children in the control group were also recruited through postings of advertisements in the community (Appendix C). For children who were recruited through advertisement postings, data collection took place at the Voice Production and Perception Lab, Elborn College, Western University.

2.1.4 Screening Children for Exclusionary Criteria

Prior to reviewing the letter of information and the informed consent, study eligibility for each potential participant was evaluated by administering the exclusionary criteria questionnaire to parents of children in both the VPI and control group (Appendix D). Children whose parent indicated that their child was delayed in their cognitive/intellectual development to a degree that they would not be capable of accurately completing self-report measures, were determined to be ineligible to participate in the study. Ineligible children and parents were thanked for their interest in the study. Children with VPI, who presented with nasal congestion, participated in the study on a later date, during a subsequent appointment at the VPI clinic when nasal congestion had resolved. Parents of children who met all criteria for participation were provided with the letter of information and consent (Appendix E & F) and children were asked to sign an assent form (Appendix G). Following consent/assent, parents were escorted to a quiet area, while children remained in the clinic room. The data collection protocol for both parents and children was conducted in a single session that required approximately 30 minutes to complete.

2.2 Instruments

2.2.1 Measure of Elementary Communication Apprehension-Revised (MECA-R)

In order to measure the communication apprehension (Capp) experiences of children in the VPI group compared with controls, the MECA-R was administered to all participant children. The MECA was developed for the purposes of measuring the experience of Capp in different social situations of elementary school-aged children (Garrison & Garrison, 1979). The MECA was originally a 20-item self-report inventory of Capp. However, based on pilot work, the current measure was revised into a 16 item instrument (MECA-R) (Dzioba et al., submitted for publication). Empirical analysis of several psychometric properties of the MECA-R based on a sample of 87 children between the ages of 7 to 14 years (77 typically developing children and 10 diagnosed with VPI) indicated that the MECA-R was psychometrically sound (Dzioba et al., submitted for publication). As such, the present study utilized the MECA-R which excluded four questions that were judged to be irrelevant in the context of the present study.

The MECA-R employs a Likert-type faces scale to assess a child's level of comfort communicating orally in a variety of social situations such as talking to authority figures, communicating with peers, and presenting in front of an audience (e.g., "How do you feel when you talk to teachers or your principal?", "How do you feel when you talk in front of a large group of people?", "How do you feel when you talk to someone you don't know very well?"). When completing the MECA-R, participants respond to each question by circling one of the following response choices: *very happy/I like it a lot, happy/I like it, no feeling/I don't care, unhappy/I don't like it, very unhappy/I really don't like it*. Responses are scored from 1 to 5, with a higher score reflecting greater perceived levels of Capp by the respondent. Half of the items were presented with the faces scale in reverse order to ensure that the respondent was carefully attending to each question and, thus, limiting potential response bias and increasing the reliability and validity of each participant's responses. The MECA/MECA-R has been used in several studies to date, reporting good levels of reliability and validity (Bourhis & Allen, 1992; Comadena &

Prusank, 1988; Dzioba et al., 2011, 2012; Garrison & Garrison, 1979; Harris, 1980; Harris & Brown, 1982; Hoffman, 1992; Hutchinson, & Neuliep, 1993a, 1993b; Krol-Jersevic, 2004; McCroskey et al., 1981).

2.2.2 Communication Attitude Test (CAT)

To evaluate whether the propensity to exhibit more positive or negative attitudes towards communicating may influence the Capp experiences of children with VPI, the Communication Attitude Test (CAT) also was utilized in this study. The CAT was constructed by Brutten & Dunham (1989) to evaluate the attitudes of children who stuttered towards speech and has been used effectively with other communication disorders as well (De Nil & Brutten, 1990; Havstam et al., 2011). The CAT consists of 35 statements about speech and different communicative situations (e.g., "Talking is easy for me", "Some kids make fun of the way I talk", "I don't worry about the way I talk", "Telling someone my name is hard for me"). The child responds to each statement as being *true* or *false* for him/her, and each response corresponding to a negative attitude is given one point. Consequently, a higher score indicates a relatively more negative attitude towards communication and a low score indicates a relatively more positive attitude. Normative values for the CAT were obtained in 1989 based on a sample of 518 American non-stuttering children aged 6-15 (mean age 10.44) years (Brutten & Dunham, 1989). The authors reported that there was no tendency towards a negative Catt (mean score = 8.24) and no differences related to age or sex (Brutten & Dunham, 1989). Several psychometric properties of the CAT have been investigated, with studies reporting good levels of reliability (internal consistency, test-retest) and validity (content, construct) (Brutten & Dunham, 1989; Vanryckeghem & Brutten, 1992).

2.2.3 Overall Satisfaction with Speech

To evaluate children's satisfaction with their speech, a one-item instrument constructed by the study investigator was also administered in the present study. The speech satisfaction question addressed the child's overall level of happiness with their speech or the way they talk (i.e., "Overall, how happy are you with your speech?"). The speech

satisfaction question utilized a 5-point faces scale ranging from *very happy* to *very unhappy* (Figure 2). Respondents circle the face or words underneath the image that represents the child's overall feelings towards their speech. Ordinal responses are transformed to a score of 1 to 5, such that higher scores indicate less satisfaction with speech.

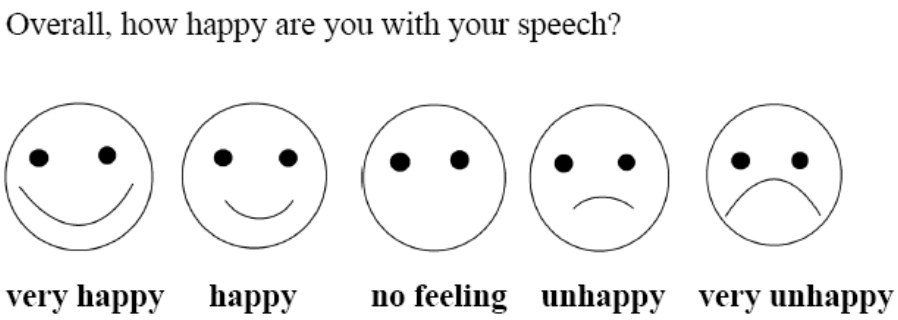

Figure 2. Speech Satisfaction Questionnaire

2.2.4 Home and Community Social Behavior Scales (HCSBS)

The HCSBS was used in the present study in order to examine potential interrelationships between social competence and Capp in children with VPI. The HCSBS is a measure of children's social behaviors and traits developed by Merrell and Caldarella (2002); it may be used to assess the social-behavioral characteristics of children and youth. The HCSBS includes two major scales: 1) the Social Competence Scale and 2) Antisocial Behavior Scale. Because the focus of this study was on social functioning and not on potential social emotional pathology only the Social Competence Scale was administered.

The Social Competence Scale is a 32-item measure used to assess social behaviors of children. The Social Competence Scale includes items that describe positive traits and social skills that reflect well-adjusted and socially competent children and youth (Merrell & Caldarella, 2002). It is a norm-referenced, standardized instrument, developed for children aged 5 to 18 years. In responding to questions posed in the measure, parents are asked to make judgments about the frequency with which a given behavior is observed (1 = *never*, 5 = *frequently*).

The Social Competence (SC) Scale is divided into two subscales: 1) Peer Relations (PR), and 2) Self-Management/Compliance (SMC). The PR subscale includes 17 items that represent behavioral characteristics important for making friends, being a positive and constructive member of a peer group, and being well-liked by other children (e.g., "Cooperates with peers", "Has good leadership skills") (Merrell & Caldarella, 2002). Items in the Peer Relations subscale are related most strongly to peer-related social competence (Merrell & Caldarella, 2002). The SMC subscale includes 15 items that reflect behaviors and characteristics important in responding to the social expectations of adults and showing appropriate self-restraint and self-management (e.g., "Completes chores without being reminded", "Asks appropriately for clarification/instruction", "Follows family and community rules"). Items within this subscale characterize behaviors that are important for complying with expectations of adults, as well as showing appropriate self-discipline and self-management (Merrell & Caldarella, 2002).

For purposes of the current study, the total SC score was used in the correlational analyses rather than each of the subscales, PR and SMC. The SC total score encapsulates a holistic description of social competence of children; given the nature of the present study, and the interest in evaluating interactions between Capp and overall social competence in children with and without speech disorders, use of the SC total score was deemed appropriate. Nonetheless, subscale scores were tallied separately as well to permit examination of individual differences.

The HCSBS has been applied to typically developing children, children with intellectual/learning disabilities, and school-aged children at risk for social behavior problems (Lund & Merrell, 2001; Merrell & Caldarella, 2002). The psychometric properties of the HCSBS are well established (Merrell & Boelter, 2001; Merrell & Caldarella, 2002; Merrell, Caldarella, Streeter, Boelter & Gentry, 2001).

2.2.5 Children's Communication Checklist – Second Edition (CCC-2)

In order to obtain a broad profile of the language and communication skills of children with VPI and its potential relationship to the multi-dimensional construct of Capp, the CCC-2 was administered. The CCC-2 was developed by Bishop (2003) as a tool to

screen for a variety of communication disorders; it consists of 70 items surveying a child's broad communicative abilities. This instrument is completed by a parent or adult who has regular contact with the child. Items are divided into 10 subscales, each consisting of 7 items (Table 3). The first four scales: A, B, C, and D, assess aspects of language structure, vocabulary and discourse (e.g., "Makes mistakes in pronouncing long words", "Forgets words he or she knows"). The next four subscales: E, F, G, and H, cover pragmatic aspects of communication (e.g., "Talks repetitively about things that no one is interested in", "Does not look at the person he or she is talking to"). The last two subscales, I and J, assess behaviors that are usually impaired in children with autism (see Table 3). For each subscale, five items describe difficulties, and two describe strengths. Parents make judgments about the frequency with which behaviors are observed (i.e., 0 = *less than once a week*; 1 = *at least once a week, but not every day*; 2 = *once or twice a day*; 3 = *several times a day, or always*). A General Communication Composite (GCC) is derived by summing scores of the first eight subscales (A-H) and, thus, provides an overall assessment of communication skill. GCC scores are standardized for age, with higher scores reflecting less communication problems (and hence, greater perceived performance).

The CCC-2 has been recently applied successfully to study the communication profiles of children with CLP (n=93) and children without CLP that served as controls (n=77) (Murray et al., 2010). The validity and reliability of the CCC-2 are well established (Bishop, 2003; Bishop & Baird, 2001; Bishop, Maybery, Wong, Maley, & Hallmayer, 2006; Helland, et al., 2009; Norbury, Nash, Baird, & Bishop, 2004).

Table 3
Children's Communication Checklist- Second Edition Subscales

A) Speech
B) Syntax
C) Semantics
D) Coherence
E) Inappropriate initiation
F) Stereotyped language
G) Use of context
H) Nonverbal communication
I) Social Relations
J) Interests

2.2.6 American Cleft Palate Clinical Data Base Committee Speech Pathology Data Entry Form (ACPA)

The ACPA protocol was utilized in the present study to provide a comprehensive assessment of VPI-related speech profiles for each child in the VPI group and to assess whether severity of speech characteristics are significantly related to perceived levels of Capp. The ACPA is a standard clinical assessment measure used by SLPs in North America to perceptually assess velopharyngeal function in children (ACPA, 1993). This instrument involves the measurement of eight possible speech characteristics associated with VPI including: hypernasality, hyponasality, audible nasal emission, velopharyngeal function, articulation proficiency, overall intelligibility, compensatory articulation, and voice quality. All voice/speech variables were rated on a six-point scale with the exception of the Velopharyngeal Function variable, which used a three point scale (1 = *adequate*, 2 = *marginal*, 3 = *inadequate*). In addition, all voice/speech variables, with the exception of the Compensatory Articulation variable, use ordinal rating scales, with lower scores representing less severe or normal voice characteristics and higher scores reflecting more severely deviated speech characteristics. In contrast, the compensatory articulation variable is not rated on severity, but rather the six-point scale represents a type of articulation error (1 = *none observed*, 2 = *glottal stop*, 3 = *pharyngeal fricative*, 4 = *pharyngeal stop*, 5 = *mid-dorsal palatal stop*, 6 = *posterior nasal fricative*). The

ACPA is a standard rating protocol completed by an SLP for every child who attends a VPI clinic in our centre.

2.3 Procedure

2.3.1 Data Collection Protocol for Children

Both the children in the VPI group and in those in the control group underwent the same data collection protocol (Figure 3). Children who met eligibility criteria and consented completed three instruments in an interview format conducted by A.D: MECA-R, CAT, and the speech satisfaction question (Brutten & Dunham, 1989; Dzioba et al., 2014; Garrison & Garrison, 1979). Prior to beginning the interview forms, the child's ability to use the MECA-R response scale was assessed. Specifically, the study investigator asked the child an initial question unrelated to the subject area (e.g., How do you feel when you have to write a test in school?) to ensure that the child knew how to use the response scale. Presentation of these two measures (i.e., MECA-R and CAT) was counterbalanced across participants to address potential order effects relative to responses provided. Finally, each child was asked to indicate their overall level of satisfaction with their speech (Figure 2). The question was presented at one of two time points: after administration of the first instrument (T1) or after administration of the second instrument (T2) [see Figure 3].

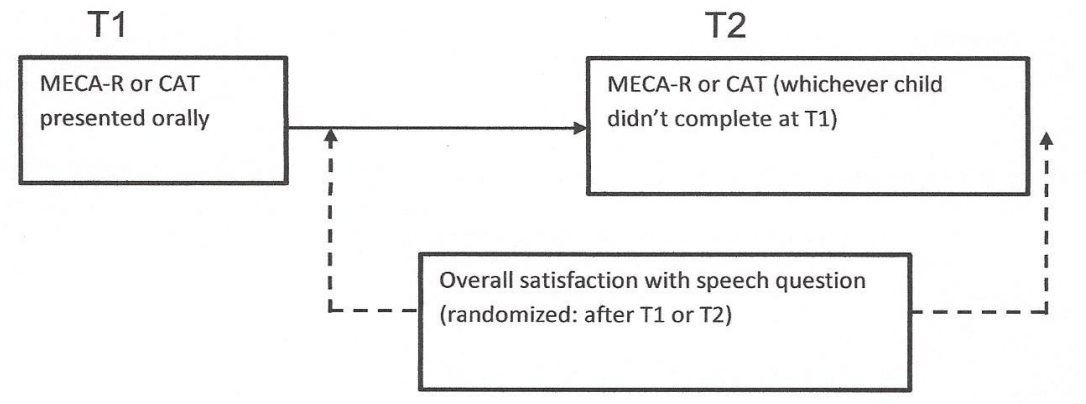

Figure 3. Data collection protocol for children. MECA-R = Measure of Elementary Communication Apprehension; CAT = Communication Attitude Test; T1 = time 1; T2 = time 2.

2.3.2 Data Collection Protocol for Parents

While children were participating in their specific research activities, parents simultaneously completed three questionnaires in a separate room: the Child Information Form, CCC-2, and HCSBS (Bishop, 2003; Merrell & Caldarella, 2002). When parents were separated from their child and escorted to a separate room, A.D. provided parents with instructions on how to complete the questionnaires included in the study protocol. Parents were then left alone to complete the questionnaires privately, while A.D. commenced with the research activities with the child in an adjacent room. A research assistant (clinical nurse) was available on site to address any questions or concerns parents may have had while completing the forms. Parents first completed the Child Information Form, which is a brief survey of the child's demographic and health information (Appendix H and I).

For parents of children assigned to the VPI group, following their completion of the Child Information Form, they also completed the CCC-2 and the HCSBS to provide a record of their child's current communication and language abilities and level of social competence (Bishop, 2003; Merrell & Caldarella, 2002). The order of the CCC-2 and HCSBS alternated from parent to parent to account for order effects. For parents of children in the control group, completion of the CCC-2 was not required because typically developing children by definition did not demonstrate speech or language problems. Hence, following completion of the Child Information form, these parents were required to complete the HCSBS only.

2.3.3 Perceptual Assessment for Children in VPI Group

For children in the VPI group, additional information regarding the child's speech status was obtained. In order to describe the child's speech quality at the time of data collection, perceptual assessment scores completed by a single, independent, experienced SLP were obtained using a standard rating protocol called the American Cleft-Palate Association Clinical Data Base Committee Speech Pathology Data Entry Form (ACPA) for each child in the VPI group (see section 2.2.6 and Appendix J). Evaluation of ACPA

scores was based on 10 speech samples. Children were asked to produce two repetitions of standard speech phrases used by SLPs to perceptually evaluate the presence and severity of speech characteristics associated with VPI (Appendix K). Speech phrases such as “Patty ate apple pie”, “Sissy sees the sky”, and “Go get a cookie for Kate” were produced by the children with VPI. In addition, spontaneous speech produced by the child while engaging in a conversation with the attending SLP was also utilized for perceptual judgments of speech.

2.3.4 Review of Health Records for Children in VPI Group

Following data collection from both the child and parent, the investigator completed the Brief Health History form for each participant in the VPI group through a second, more in-depth review of patient health records available at the VPI clinic (Appendix L). This form provided a more comprehensive description of the health history of the child, including treatment for VPI, hearing issues, past surgeries, time since surgery, etc. Table 4 displays the health history of children in the VPI group. Variability in middle ear infections, other speech or voice disorders, in addition to variability in treatment approaches for VPI (speech therapy, surgical correction, etc.), suggest a highly heterogeneous group of individuals, typically evidenced in this clinical population (Dzioba et al., 2013).

Table 4

Health History of Children with VPI (n = 20)

Item	Yes (n)	No (n)
1) Other voice or speech disorder?	3[a]	17
2) History of middle ear infection?	11	9
3) History of tubes?	10	10
4) Tubes currently in place?	7	13
5) Speech therapy?	17	3
6) Focus of speech therapy:		
Articulation	15	5
Resonance	13	7
Language	5	15
7) Surgery for VPI?	7	13
If Yes, time since surgery:		
< 1 year	2	N/A
1- 4 years	5	N/A

Note. VPI = velopharyngeal insufficiency; [a]three cases of mild articulation disorder reported by parents; N/A = not applicable.

Chapter 3

3 Results

To address the research questions posed in this study, multiple statistical analyses were undertaken. Analyses chosen were based on whether assumptions of normality and equality of variance were met for the data obtained. Further, with the exception of a between-group difference approach to addressing the first research question, given the diversity of the group with VPI, and the exploratory nature of questions probing potential relationships, an individual difference approach (i.e., correlational analyses) was deemed the appropriate approach for data analysis. For all tests, statistical significance was set a priori at the 0.05 alpha level. However, prior to conducting these analyses, several preliminary investigations of the data were performed.

3.1 Preliminary Analyses

Before answering each research question, preliminary analyses of age and gender, analyses of diagnostic subgroupings of children with VPI, exploration of the communication abilities of children in the VPI group, and reliability analyses of outcome measure scores were conducted. These preliminary investigations were undertaken to explore whether social and communicative functioning of study participants may be influenced by these demographic and health variables and, hence, whether subsequent analyses should be conducted on subgroups of children with VPI and controls. Furthermore, reliability statistics were calculated to identify whether the study instruments were internally consistent for the present study samples.

3.1.1 Age and Gender Differences on Outcome Variables

Prior to initiating between group and correlational analyses, the potential for age and gender differences on the outcome measures (i.e., MECA-R, CAT, HCSBS, and CCC-2) were considered. Because childhood and adolescence are periods characterized by substantial developmental changes, the potential influence of age differences on

psychosocial experiences were considered. The current study was comprised of children between the ages of 7 to 14 years. However, the age distribution of these children was skewed to the lower end of the age range. That is, 33 children were between the ages of 7 to 10 years, while only 7 children were between the ages of 11 and 14. With such unequal groups, parametric comparisons between younger and older children were not conducted. Instead, and as illustrated in Figure 4, boxplots of total scores for all social and communicative measures (i.e., HCSBS, CCC-2, MECA-R and CAT) were constructed to identify whether potential outliers represented children from the older age group (i.e., 11 to 14 years). As can be seen on Figure 4, the boxplot for the CAT revealed no outliers of any age. For the remaining measures (HCSBS, CCC-2, MECA-R), the boxplots revealed several outliers (i.e., those with scores that fell outside the 25^{th} to 75^{th} percentile range); however, none of these represented the scores of children 11 years or older. As such, on the basis of no pattern of age advantage or disadvantage in performance, the older children were combined with the younger children in subsequent data analyses.

Gender was equally distributed in both groups of participants and statistical analyses of instrument scores were conducted for gender subgroups. Independent samples t-tests or Mann-Whitney U tests (depending on whether the assumption of normality was met for a particular measure) revealed non-significant differences in mean scores between males and females in the VPI group, as well as the control group on the MECA-R (VPI: $U = 28.50$, $z = -1.51$, $p > .05$; control: $U = 33.00$, $z = -1.17$, $p > .05$), HCSBS (VPI: $U = 44.50$, $z = -.27$, $p > .05$; control: $U = 43.50$, $z = -.35$, $p > .05$), CAT (VPI: $t(18) = -.79$, $p > .05$; control: $t(18) = .45$, $p > .05$), and CCC-2 (VPI: $t(18) = -.38$, $p > .05$). Thus, data from males and females were grouped together for subsequent analyses. In addition to age and gender effects, diagnostic subgroups of children in the VPI group were also investigated to examine the potential for etiological-based difference on performance.

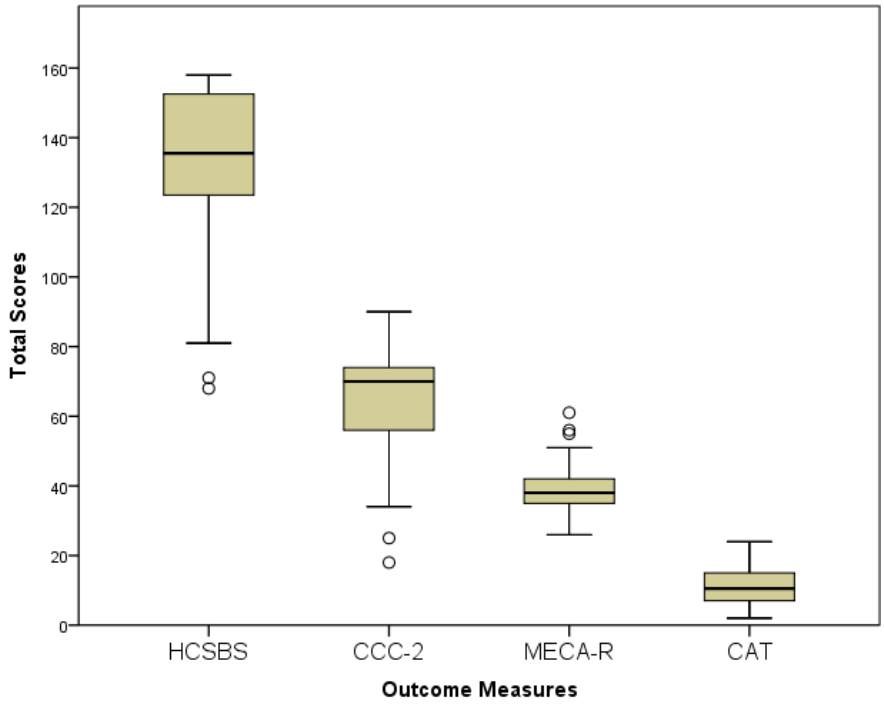

Figure 4. Box plots displaying HCSBS, CCC-2, MECA-R, and CAT total scores for children with VPI and control participants. Note. The circles represent cases of extreme scores; HCSBS = Home and Community Social Behavior Scales; CCC-2 = Children's Communication Checklist-Second Edition; MECA-R – Measure of Elementary Communication Apprehension-Revised; CAT = Communication Attitude Test.

3.1.2 Subgroupings of Children with VPI

Heterogeneity is typical of most clinical populations and this is certainly true of children and adolescents with VPI, particularly given the varied anatomical structures that may be affected and the associated secondary impairments that may or may not be present (e.g., syndromes, cognitive delays, etc.). Thus, although a diverse group of children with VPI were sought, there is a potential for secondary or associated impairments to differentially affect the performance on the outcome measures. In the present study, the VPI cohort included children with and without all combinations of clefts, as well as children presenting with VPI unrelated to CLP. There were five subgroups of children with VPI based on primary diagnosis, each with small sample sizes (a range of 2 to 6 children per group). Subgrouping of the 20 participants with VPI according to presence/absence of syndromes also resulted in two unequal samples (7 and 13 children, respectively). Descriptive statistics for these subgroups of children with VPI (i.e., diagnostic subgroups

and syndrome/nonsyndrome subgroups) are shown in Table 5 and Table 6, respectively. Table 5 illustrates the heterogeneity of the VPI cohort even at the etiological subgroup level. As a general observation (although a few exceptions are evidenced), the distribution of the ranges of scores across the subgroups for each outcome measure overlap, thereby suggesting all children are functioning within a similar range of performance. Nonetheless there are individuals who stand out for their low scores. For example, on the CAT such a score would indicate a more positive attitude toward communication than most participants or sometimes greatly diminished social or formal communication abilities as measured by the HCSBS or CCC-2. These levels of performance cannot be generalized to the subgroup as a whole due to the small number of participants in each. However, suffice it to say that while combinations of impairments associated with VPI may impact social and communicative functioning within a particular individual, these descriptive data cannot predict the conditions in which a negative impact might occur more broadly in such etiological subgroups of children.

Table 6 displays descriptive statistics for the study variables [MECA-R scores, CAT scores, HCSBS scores, CCC-2 scores, Speech Satisfaction (SS) scores] for children with VPI who were also diagnosed with a genetic syndrome and those who did not present with a syndrome. Mean scores on the outcome variables suggest higher levels of Capp (higher MECA-R scores), lower social competence (lower HCSBS scores) and greater communication deficits (lower CCC-2 scores) for children with VPI with a syndrome compared to those without a syndrome. In contrast, average scores for Catt (CAT scores) and speech satisfaction (SS scores) were similar for children with and without a syndrome. T-tests and Mann-Whitney U tests (depending on whether assumptions of normality were met) for differences in mean scores of outcome measures between those children with VPI with and without an identified syndrome revealed statistically nonsignificant difference between groups (MECA-R: $U = 31.50$, $z = -1.12$, $p > .05$; HCSBS total: $U = 35.00$, $z = -.83$, $p > .05$; CAT: $t(18) = .14$, $p > .05$; CCC-2: $t(18) = 1.52$, $p > .05$); however, given the possibility that the nonsignficant finding could be related to low statistical power, results should be interpreted with caution.

Table 5

Descriptive Statistics of Outcome Variables for Diagnostic Subgroups of Children with VPI

	SMCP (n= 3)	CP (n=5)	CLP (n=4)	22q (n=2)	Unknown (n= 6)
MECA-R					
M (SD)	42.33 (12.10)	45.80 (0.09)	39.75 (3.30)	38.50(3.54)	41.17 (6.24)
Mdn	38.00	43.00	41.00	38.50	41.50
Min-Max	33 to 56	37 to 61	35 to 42	36 to 41	32 to 51
CAT					
M (SD)	12.33 (2.52)	17.40 (4.93)	11.75 (6.29)	18.00 (2.83)	16.67 (3.50)
Mdn	12.00	16.00	9.50	18.00	16.00
Min-Max	10 to 15	13 to 24	7 to 21	16 to 20	12 to 22
HCSBS					
M (SD)	86.65 (29.77)	136.20 (11.95)	131.25 (14.93)	119.50 (51.62)	118.67 (28.23)
Mdn	71.00	135.00	133.50	119.50	127.50
Min-Max	68 to 121	120 to 153	111 to 147	83 to 156	81 to 150
CCC-2					
M (SD)	31.67 (17.95)	61.80 (11.12)	56.25 (11.79)	60.00 (1.41)	53.83 (23.03)
Mdn	25.00	63.00	56.50	60.00	43.50
Min-Max	18 to 52	45 to 76	42 to 70	59 to 61	34 to 90
SS					
M (SD)	1.67 (0.58)	2.60 (1.52)	2.50 (1.00)	1.00 (.00)	2.00 (.82)
Mdn	2.00	2.00	3.00	1.00	2.00
Min-Max	1 to 2	1 to 5	1 to 3	1 to 1	1 to 3

Note. Abbreviations: SMCP = submucous cleft palate; CP = cleft palate; CLP = cleft lip and palate; 22q = 22q deletion syndrome; Unknown = unknown causes of VPI; MECA-R = Measure of Elementary Communication Apprehension Revised; CAT = Communication Attitude Test; HCSBS = Home and Community Social Behavior Scale; CCC-2 = Children's Communication Checklist – Second Edition; SS = Speech Satisfaction Measure; VPI = velopharyngeal insufficiency; M (SD) = mean (standard deviation); Mdn = median; Min-Max = minimum to maximum; MECA-R range: 16 to 80; CAT range: 0 to 35; HCSBS scale range: 32 to 160; SS range: 1 to 5, higher scores reflect less satisfaction with speech; CCC-2 scores are standardized for age and can range between 0 and 152, depending on age of child.

Table 6

Descriptive Statistics of Outcome Variables for Children with VPI with a Syndrome and those without a Syndrome

	Syndrome Subgroup (n= 7)	Nonsyndrome Subgroup (n=13)
MECA-R		
M (SD)	46.00 (10.20)	39.77 (3.92)
Mdn	42.00	41.00
Min-Max	33 to 61	32 to 46
CAT		
M (SD)	15.14 (6.18)	15.46 (4.01)
Mdn	15.00	15.00
Min-Max	7 to 24	9 to 21
HCSBS		
M (SD)	110.14 (36.15)	126.62 (21.87)
Mdn	121.00	133.00
Min-Max	68 to 156	83 to 153
CCC-2		
M (SD)	45.57 (20.01)	57.92 (15.83)
Mdn	45.00	60.00
Min-Max	18 to 76	34 to 90
SS		
M (SD)	1.71 (0.76)	2.31 (1.18)
Mdn	2.00	2.00
Min-Max	1 to 3	1 to 5

Note. Abbreviations: VPI = velopharyngeal insufficiency; MECA-R = Measure of Elementary Communication Apprehension-Revised; CAT = Communication Attitude Test; HCSBS = Home and Community Social Behavior Scale; CCC-2 = Children's Communication Checklist- Second Edition; SS = Speech Satisfaction Questionnaire; M (SD) = mean (standard deviation); Mdn = median; Min-Max = minimum to maximum; MECA-R range: 16 to 80; CAT range: 0 to 35; HCSBS scale range: 32 to 160; SS range: 1 to 5, higher scores reflect less satisfaction with speech; CCC-2 scores are standardized for age and can range between 0 and 152, depending on age of child.

Generalizations of data from these small diagnostic and syndrome/nonsyndrome subgroups to the social and communicative functioning of children with similar characteristics should not be made because of the sample sizes and the heterogeneity of our subgroups. However, it remains possible that characteristics associated with those etiologies and syndromes may influence social and communicative functioning within an individual. Recognizing this heterogeneity, it has nonetheless been shown that ranges of performances over outcome measures overlap sufficiently among diagnostic subgroups of children with VPI. Furthermore, no statistically significant differences in average scores on the outcome measures comparing children with and without syndromes were identified. As such, the VPI cohort was treated as a single group for all further statistical analyses.

3.1.3 Verbal Communication Skills of Children with VPI

Varying levels of communicative abilities are often evidenced in children with VPI (Dzioba et al., 2013). As such, the present study utilized the CCC-2 to gather information about the speech, language, and language use abilities of this sample of children with VPI. As described in section 2.2.5, the GCC score is an indicator of a child's overall communicative abilities and is comprised of the first 8 subscales of the CCC-2 (see Table 3, section 2.2.5). A GCC standard score of less than 55 (10^{th} percentile) is suggested to distinguish children with clinically significant communication impairment from children with normal communicative abilities (Bishop, 2003). Applying this criterion to the present study, 10 children with VPI received a GCC score below 55, indicative of significantly impaired communication, while 10 children scored in the normal range (GCC 55 or greater).

Following the identification of the children with VPI who presented with communication deficits from those who did not, further descriptive analyses were conducted to identify what areas of communication (i.e., CCC-2 subscales) were most impaired in these children. Table 7 displays CCC-2 subscale Means (SDs) standardized for age for children with VPI with normal communication (GCC sum 55 or greater) and children with VPI with communication deficits (GCC sum < 55). The CCC-2 subscales were then

Table 7

Means and Standard Deviations for CCC-2 Subscale Scaled Scores for Normal Communication (GCC sum = ≥ 55) versus Communication Impaired (GCC sum = < 55) Subgroups of Children with VPI

	Communication Subgroups		
Subscale	Communication Impaired (n=10)	Normal Communication (n = 10)	Combined (n=20)
Language (A-D)	17.20 (4.64)	32.30 (6.60)	24.75 (9.53)
Pragmatics (E-H)	22.10 (7.59)	35.60 (5.17)	28.85 (9.34)
A. Speech	2.90 (1.79)	5.80 (3.58)	4.35 (3.13)
B. Syntax	4.60 (1.90)	9.50 (3.10)	7.05 (3.55)
C. Semantics	4.90 (1.52)	8.00 (2.26)	6.45 (2.46)
D. Coherence	4.80 (1.62)	9.00 (2.50)	6.90 (2.97)
E. Inappropriate Initiation	5.90 (1.97)	9.00 (2.45)	7.45 (2.68)
F. Stereotyped Language	4.80 (1.93)	9.30 (3.09)	7.05 (3.41)
G. Use of Context	5.10 (1.91)	9.90 (2.64)	7.50 (3.33)
H. Nonverbal Communication	6.30 (3.06)	7.40 (1.65)	6.85 (2.46)
GCC (A-H)	39.30 (11.16)	67.90 (9.96)	53.60 (17.92)

Note. Abbreviations: CCC-2 = Children's Communication Checklist-Second Edition; GCC = General Communication Composite; CCC-2 total scores (i.e., GCC scores) and subscale scores (A-H) are standardized for age; subscale scores can range between 0 to 9, depending on age of child; CCC-2/GCC scores can range between 0 and 152, depending on age of child.

combined into two composite standardized scores: 1) a Structural Language Composite targeting speech and formal linguistic abilities and consisting of subscales A-D (i.e., speech, syntax, semantics, & coherence), and, 2) a Pragmatic Composite targeting aspects of communication that describe a child's use of language in context, derived from the summation of scales E-H (inappropriate initiation, stereotyped language, use of context, and nonverbal communication) (Murray et al., 2010). Subscales I and J assess behaviors that are typically impaired in cases of autistic disorder and hence, were not included in these analyses (Bishop, 1998). Dependent t-tests indicated that the subgroup of children with VPI with communication impairment experienced significantly more decrements in the Structural Language Composite compared with the Pragmatic subscale ($t(9) = -2.79$, $p < .05$, $r = .68$).

3.1.4 Speech Severity of Children with VPI

In addition to describing the linguistic aspects of communication skills in children with VPI, a description of speech characteristics of children in the clinical group as measured by the ACPA rating scale was explored. Table 8 displays the descriptive statistics of the speech severity ratings of children with VPI based on perceptual assessment scores for six dimensions as provided by an SLP on the ACPA. The distribution of each severity rating (1 = *normal*, 6 = *severe*) can be found in Appendix M. Based on the auditory-perceptual evaluation of speech for this group, on average children with VPI were judged to exhibit moderate hypernasality and audible nasal air emission, mild-moderate deficits in overall intelligibility and articulation proficiency, normal voice quality, and no perceptible hyponasality.

Overall, the children with VPI exhibited a wide range of communicative abilities in both linguistic and speech domains. Decrements in various aspects of these communicative functions (i.e., linguistic and speech) may interact with the psychosocial functioning of children. Prior to exploring these relationships, reliability statistics of the study instruments were calculated.

Table 8

Descriptive Statistics of Perceptual Assessment (ACPA)[a] *Scores of Speech Characteristics of Children in the VPI Group (n=20)*

Speech Characteristic	Mean (SD)	Median	Min-Max
Hypernasality (n)	3.65 (1.35)	4.00	2 to 6
Audible Nasal Emission (n)	3.90 (1.25)	4.00	2 to 6
Articulation Proficiency (n)	2.75 (1.12)	3.00	1 to 5
Overall Intelligibility (n)	3.00 (1.08)	3.00	2 to 5
Hyponasality (n)	1.25 (0.55)	1.00	1 to 3
Voice Quality (n)	1.20 (0.52)	1.00	1 to 3

Note. ACPA = American Cleft-Palate Association Clinical Data Base Committee Speech Pathology Data Entry Form (Revised); [a]ACPA rating scale of severity of speech characteristic is a 6 point ordinal scale: 1 = normal; 2 = mild; 3 = mild-moderate; 4 = moderate; 5 = moderate-severe; 6 = severe.

3.1.5 Internal Consistency of Study Instruments

As a final preliminary analysis, the reliabilities of the instruments utilized in the study were evaluated. According to the contemporary view of psychometric assessment, the reliability of measurement instruments should be evaluated for every study sample it is administered to, regardless of whether questionnaire reliability has previously been established (Thompson, Diamond, McWilliam, Snyder & Snyder, 2005). As such, the internal consistency of all questionnaires was assessed for the cohort used in the present study (VPI + control group) by calculating Cronbach's alpha.

For the CCC-2[2], the internal consistency was assessed for GCC sum scores. Good-to-excellent levels of internal consistency were identified for the CCC-2 (Cronbach's alpha for GCC sum = .88). For the HCSBS, Cronbach's alpha for the Social Competence scale was derived. Results indicated very high levels of internal consistency for the HCSBS (α

[2] Cronbach's alpha for CCC-2 only performed on VPI group data as parents of children in the control group did not complete this measure.

= .98). Results of the reliability analyses for the MECA-R indicated a fair level of internal consistency (α = .76). Finally, Cronbach's alpha yielded good levels of internal consistency for the CAT for the combined group data (α = .83). In sum, Cronbach's alphas of the outcome measures suggest fair-to-excellent levels of internal consistency for the HCSBS, CCC-2, MECA-R and CAT.

3.2 Between Group Differences in Communication Apprehension

Previous research has identified higher levels of Capp in children with VPI compared with typically developing children (Dzioba et al., 2011, 2012). In the present study, the first research question explored whether these findings could be replicated in a more diverse group of children with VPI utilizing a modified version of the MECA, the MECA-R. Table 9 displays descriptive statistics for MECA-R total scores for children with VPI compared to controls. A seven point difference in mean MECA-R scores was found between children with VPI and controls. A one-tailed Mann-Whitney U test indicated that children with VPI had significantly higher MECA-R scores (M = 41.95, SD = 7.20) than typically developing children (M = 34.95, SD = 8.28), U = 97.50, z = -2.78, $p < .001$ (one-tailed), d = .90. This difference in MECA-R scores represents a moderate effect (Field, 2009, p.170)[3]. Hence, as reported in earlier work, on average the children with VPI in this study reported experiencing higher levels of anxiety across speaking situations compared with their typically developing counterparts. Increased levels of Capp may in turn be related to subjective appraisals of internal states such as one's attitude towards speech or one's overall level of satisfaction with speech, in addition to the child's speech and language communication skills and social competence. Potential relationships between Capp and these constructs were addressed in the analyses for the next research question.

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[3] This moderate effect for the between group difference in MECA-R scores achieved 87% power.

Table 9

Descriptive Statistics for MECA-R Total Scores[a] for Children with VPI and Controls

	VPI Group (n=20)	Control Group (n= 20)
Mean (SD)	41.95 (7.20)	34.95 (8.28)
Median	41.50	35.50
Min to Max	32 to 61	20 to 55
W[b]	.89*	.96‡

Note. Abbreviations: MECA-R = Measure of Elementary Communication Apprehension-Revised;VPI = velopharyngeal insufficiency; SD = standard deviation; Min = minimum; Max = maximum; [a]MECA-R range: 16 to 80; [b]Shapiro-Wilks *W* statistic of normality; * $p < .05$; ‡ ns.

3.3 Relationship between Capp and Social and Communicative Function for Combined Cohort

The second research question addressed potential correlational relationships between Capp and communication constructs related to other subjective judgments of speech such as Catt, satisfaction with speech and general constructs of social functioning in the combined cohort. This addresses the larger conceptual issue raised in the review of literature about the presence of such relationships. Communication attitude was assessed with CAT total scores, satisfaction with speech was evaluated with the Speech Satisfaction (SS) measure, and social competence was assessed with HCSBS Social Competence total scale scores. Descriptive statistics for MECA-R, CAT, SS, and HCSBS scale scores for the combined cohort (children with VPI and controls) are displayed in Table 10.

Table 11 displays Pearson intercorrelations between MECA-R total scores, HCSBS total scores, CAT total scores, and responses to the SS measure for the entire cohort to ensure maximum variability. As shown in Table 11, Pearson correlations using the combined cohort data revealed statistically significant relationships that were of moderately low to

Table 10

Descriptive Statistics for Outcome Measure Scores for Combined Cohort (n = 40)

Measure	Mean (SD)	Median	Min to Max
MECA-R	38.45 (8.44)	38.00	20 to 61
CAT	11.38 (5.66)	10.50	2 to 24
HCSBS	131.80 (24.45)	135.50	68 to 158
SS	1.83 (.93)	2.00	1 to 5

Note. Abbreviations: SD = standard deviation; Min = minimum; Max = maximum; MECA-R = Measure of Communication Apprehension-Revised; CAT = Communication Attitude Test; HCSBS = Home and Community Social Behavior Scale; SS = Speech Satisfaction measure; MECA-R range: 16 to 80; CAT range: 0 to 35; HCSBS scale range: 32 to 160; SS range: 1 to 5; higher scores reflected less satisfaction with speech (1 = very happy, 5 = very unhappy).

Table 11

Pearson Intercorrelations [95% CIs] between Social and Communicative Constructs for Combined Cohort (n = 40)

	1	2	3	4
1. MECA-R	-	.63* [.40, .79]	-.39* [-.63, -.10]	.27* [-.05, .54]
2. CAT		-	-.45* [-.67, -.16]	.48* [.20, .69]
3. HCSBS			-	-.09‡ [-.39, .23]
4. SS				-

Note. * $p < .05$, one-tailed; ‡ ns; CIs = confidence intervals; MECA-R = Measure of Elementary Communication Apprehension-Revised; CAT = Communication Attitude Test; HCSBS = Home and Community Social Behavior Scale; SS = Speech Satisfaction Measure.

moderate magnitudes between Capp and the other measured constructs. The strongest relationship was found between Capp and Catt (r = .63), indicating that for the children in this study, higher levels of Capp were associated with more negative attitudes towards communication.

Furthermore, although of lesser magnitude, significant relationships between Capp and social competence and speech satisfaction were identified. These relationships were logically expected and are supported by the literature. In addition, contrary to the research investigators' prediction of expected study outcomes, stronger correlations of moderate magnitude were revealed between *Catt* (rather than Capp) and these latter two variables (i.e., speech satisfaction and social competence)[4]. The negative correlations suggest that both increased levels of Capp and more negative attitudes towards communication are associated with decrements in social competence in the combined cohort of children. Finally, no meaningful relationship was identified between social competence and speech satisfaction. Thus, for the entire cohort, logical relationships between Capp and other communicative and social functions were supported by the present data. Capp and communicative attitude had the strongest relationship among all of the variables and, hence, likely share some common characteristic. However, interestingly, it was one's attitude toward speech rather than apprehension about speaking that formed strongest relationships with the other variables. This suggests that Catt may contribute more to a child's social and communicative functioning than does Capp.

In addition, given that a significant relationship was identified between the two communication-orientation constructs (i.e., Capp and Catt), and that stronger relationships between *Catt* (rather than Capp) and social-communicative constructs were found in the combined cohort of children, partial correlations which controlled for Catt were also explored to gain a better understanding of how attitude towards communication influenced interrelationships among social-communicative constructs for this data set.

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[4] However, 95% confidence interval calculations for these correlations (see Table 11) suggest statistically nonsignificant differences in the strength of correlations between Capp and socio-communicative constructs versus correlations between Catt and socio-communicative constructs.

Table 12

Partial Intercorrelations between Social and Communicative Constructs for Combined Cohort (VPI + Control Group) (n= 40) Controlling for Communication Attitude

	1	2	3
1. MECA-R	-	-.16‡	-.04‡
2. HCSBS		-	.16‡
3. SS			-

Note. ‡ ns; VPI = velopharyngeal insufficiency; MECA-R = Measures of Elementary Communication Apprehension-Revised; HCSBS = Home and Community Social Behavior Scale; SS = Speech Satisfaction Measure.

Table 12 displays the partial intercorrelation values obtained between social and communicative constructs for the total cohort of children in the present study while holding *Catt* constant. Compared with the zero order correlations, results from the partial correlations indicated changes in the strength of interrelationships among social and communicative constructs that ranged between .23 and .25 units. In this case, Catt had both a *diminishing* and *increasing* effect on associations between psychosocial constructs. Communication attitude had a *diminishing* effect on correlations between Capp and social and communicative function. After holding Catt constant, *both* relationships between Capp and social and communicative function *decreased* by .23. The association between Capp and social competence went from a moderate, statistically significant correlation to a small, nonsignificant relationship. Similarly, when holding Catt constant the relationship between Capp and speech satisfaction changed from a small-to-medium zero order correlation to a negligible relationship. In contrast, although the relationship between social competence and speech satisfaction changed from a negligible negative relationship to a small positive association after controlling for Catt, the partial correlation remained nonsignificant. As such, Catt influenced intercorrelations between social and communicative constructs, having the greatest (diminishing) effect on associations between intercorrelations with the Capp construct.

3.4 Relationship between Capp and Social and Communicative Function in Children with VPI

In addition to assessing relationships between communication and social constructs in the entire cohort of participants, correlations between these constructs were evaluated separately for children in the VPI group. Given that correlational analyses revealed some expected as well as some unexpected relationships about Capp broadly, these separate analyses permitted the desired exploration of the Capp experience for children with VPI. Interrelationships between the same constructs (i.e., Capp, Catt, speech satisfaction, social competence) were explored; additionally, the communication skills of children with VPI (i.e., based on scores on the CCC-2) were also included in the correlational analyses of the VPI group data. As noted in the review of literature, the communication skills of children with VPI are likely to be associated with the other social-communication constructs (Murray et al, 2010).

Table 13 displays the intercorrelations between the social and communicative constructs for children with VPI. Pearson correlations based on data from the VPI group resulted in only three statistically significant relationships. A significant moderate relationship between Capp and Catt was identified for the group of children with VPI. A moderately large and significant relationship between Catt and speech satisfaction was found for children with VPI suggesting that more negative attitudes towards communication are associated with lower overall levels of satisfaction with one's speech. In addition, a moderately strong relationship (.68) was found between social competence and communication skills (CCC-2 scores) for children with VPI. This suggests that formal communication skills (i.e., sentence structure and vocabulary), may contribute more to a child's social and broad communicative functioning than Capp or any of the other communicative constructs explored (Catt, speech satisfaction). Relationships between Capp and the other three constructs (speech satisfaction, social competence, communication skills) were negligible to small (r = -.23) and nonsignificant (p > .05, one-tailed). Relationships between social competence and Catt were also nonsignificant.

In addition to the Pearson intercorrelations between the social and communicative constructs, partial correlations that controlled for Catt were also conducted because of its shared variance with Capp. This was intended to provide a better understanding of how attitude towards communication influences interrelationships among social-communicative constructs for children with VPI.

Table 14 displays the partial intercorrelation values obtained between social-communicative constructs for children in the VPI group only after controlling for *Catt*. Compared with the zero order correlations, results of partial correlations when holding Catt constant, indicated changes in the magnitude of associations among social and communicative constructs that ranged between .02 and .32. With the exception of a small negligible *decrease* in the relationship between Capp and social competence, holding Catt constant had an *increasing* effect on interrelationships between Capp and social-communicative constructs in children with VPI. Controlling for Catt resulted in an increase of .12 in the strength of the relationship between Capp and communication skills. In addition, Catt had the largest *increasing* effect on the relationship between Capp and speech satisfaction, increasing the strength of the association from negligible to medium. No differences in the significance of intercorrelations between social and communicative constructs in children with VPI were observed after controlling for Catt.

Table 13

Pearson Intercorrelations [95% CIs] between Social and Communicative Constructs for VPI Group (n = 20)

	1	2	3	4	5
1. MECA-R	-	.47* [.04, .76]	-.23 [-.61, .24]	.02 [-.43, .46]	-.16 [-.56, .30]
2. CAT		-	-.11 [-.53, .35]	.52* [.10, .78]	.19 [-.28, .58]
3. HCSBS			-	-.05 [-.48, .40]	.68* [.34, .86]
4. SS				-	-.02 [-.46, .43]
5. CCC-2					-

Note. * $p < .05$, one-tailed; CIs = confidence intervals; VPI = velopharyngeal insufficiency; MECA-R = Measure of Elementary Communication Apprehension-Revised; CAT = Communication Attitude Test; HCSBS = Home and Community Social Behavior Scale; SS = Speech Satisfaction Measure; CCC-2 = Children's Communication Checklist-Second Edition.

Table 14

Partial Intercorrelations between Social and Communicative Constructs in Children with VPI (n = 20) Controlling for Communication Attitude

	1	2	3	4
1. MECA-R	-	-.21	-.30	-.28
2. HCSBS		-	.13	.72*
3. SS			-	-.14
4. CCC-2				-

Note. * $p < .05$, one-tailed; VPI = velopharyngeal insufficiency; MECA-R = Measure of Elementary Communication Apprehension-Revised; HCSBS = Home and Community Social Behavior Scale; SS = Speech Satisfaction Measure; CCC-2 = Children's Communication Checklist-Second Edition.

3.5 Relationship between Communication Constructs and Speech Severity in Children with VPI

To answer the third research question posed in this study, that which specifically addressed potential relationships between communication constructs and speech severity in children with VPI, Pearson correlations were performed. Table 15 displays intercorrelations between the communication constructs (Capp, Catt, speech satisfaction) and measures of speech severity for children with VPI. Due to the fact that speech severity scores for voice quality and hyponasality were judged as normal for the majority of children with VPI (see Table 8), limited variability in scores on these two speech parameters were observed. As such, Pearson correlations between Capp and these two speech characteristics were not assessed.

Strong intercorrelations among all speech variables (hypernasality, nasal air emission, articulation proficiency, overall intelligibility) were identified, with the largest and not unexpected relationship found between hypernasality and nasal air emission. These strong significant interrelationships among the speech severity measures are supported by the literature. Contrary to the research investigator's prediction of the existence of a relationship between Capp and speech severity measures in children with VPI, correlations between Capp and all speech variables were small and nonsignificant. However, significant relationships between Catt and speech severity measures were observed. Although moderate correlations between Catt and all speech variables were identified, only the relationships between Catt and overall intelligibility and between Catt and nasal air emission, reached significance; hence, more negative speech-related communication attitudes were found to be associated with more unintelligible speech and greater levels of nasal air emission in children with VPI. Finally, no significant relationships between children's ratings of satisfaction with speech and speech severity were identified.

Table 15

Pearson Intercorrelations [95% CIs] between Communication Constructs and Speech Severity in Children with VPI (n= 20)

	1	2	3	4	5	6	7
1. MECA-R	-	.47*[.04, .76]	.02[-.43, .46]	-.06[-.49, .39]	-.11[-.53, .35]	-.11[-.53, .35]	.05[-.40, .48]
2. CAT		-	.52*[.10, .78]	.36[-.10, .70]	.39*[-.06, .71]	.36[-.10, .70]	.48*[.05, .76]
3. SS			-	.21[-.26, .60]	.17[-.30, 57]	.02[-.43, .46]	.14[-.32, .55]
4. Hypernasality				-	.91*[.78, .96]	.60*[.21, .82]	.76*[.48, .90]
5. Audible Nasal Emission					-	.62*[.25, .83]	.78*[.52, .91]
6. Articulation Proficiency						-	.83* [.61, .93]
7. Overall Intelligibility							-

Note. Hyponasality and Voice Quality were not included in the correlational analysis because most children were rated as "normal" on these speech characteristics (*Mdn* = 1.00); * $p < .05$, one-tailed; VPI = velopharyngeal insufficiency; MECA-R = Measure of Elementary Communication Apprehension-Revised; CAT = Communication Attitude Test; SS = Speech Satisfaction Measure.

In summary, the child-rated communication construct that was most closely associated with ratings of speech from the ACPA was Catt rather than Capp; no significant relationships were identified between levels of Capp experienced during speaking situations and degree of speech abnormality in children with VPI. Hence, although the severity of speech deficits does tend to bring about more negative internalized feelings regarding speech, elevated levels of anxiety during speaking contexts were not found be related to the severity of abnormalities in the children's speech based on the ratings of an SLP.

Chapter 4

4 Discussion

4.1 Summary of Results

The purpose of the present investigation was to explore the construct of communication apprehension (Capp) and its potential relationship to social and communicative functioning in a cohort of children with and without a speech disorder (i.e., VPI), followed by an in-depth exploration of these interrelationships within the VPI group. Expected relationships between Capp and social and communicative functioning emerged for the combined cohort of children, but not so for the VPI group alone. However, significant relationships between *Catt* and social-communicative constructs were identified for *both* the combined cohort data and the VPI group only data. Unexpectedly, results of the present study found that Catt, rather than Capp, was more strongly related to the functional abilities of both the combined cohort of children and children with VPI alone. A discussion of results specific to each research question posed in the present study will be addressed subsequently below.

4.2 Between Group Differences in Capp

The first research question explored whether a difference in Capp levels exists between typically developing children and a diverse group of children with VPI. This group comparison was conducted to identify whether previous reports of differences in Capp experiences in children with VPI versus controls (Dzioba et al., 2011, 2012) could be replicated with a cohort of children with VPI presenting with a greater diversity of etiologies. A replication of previous findings would provide additional empirical support for the conclusion that the presence of VPI, *regardless of underlying etiology*, places a child at increased risk for experiencing Capp.

A statistically significant between-group difference in mean total MECA-R scores was found between children in the VPI group and children in the control group; these data indicate that on average, children with VPI experience higher Capp than controls. A 7-

point difference in total MECA-R scores was found between the cohort with VPI and typically developing cohort. This finding is consistent with previous studies by Dzioba et al., (2011, 2012) utilizing the original 20-item MECA instrument in which between 7- and 10-point differences in MECA scores were found. Total MECA-R scores of children with VPI and controls overlapped to a degree. This finding is not surprising given that Capp is also present in the general childhood population (Garrison & Garrison, 1979; McCroskey, 1977; McCroskey et al., 1981; Wheeless, 1971). However, considering group performance, children with VPI presented with more apprehension about communication experiences than did their typically-developing peers. In addition, results of the present study extends these findings to a more diverse group of children, including those with facial disfigurement (i.e., CLP) and children with an identified syndrome, subgroups of children with VPI that were not included in previous investigations (Dzioba et al., 2011, 2012).

Heightened levels of Capp in children with VPI may be related to fear of being perceived or judged negatively by others (Byrne, Flood, & Shanahan, 2012). In a qualitative study of individuals with Capp, but not with VPI or other speech disorders, fear of being negatively evaluated by peers was a key factor that contributed to the precipitation of Capp (Byrne et al., 2012). For children with VPI, it can be speculated that fear of being rejected by peers may be *heightened* due to one's speech dysfunction (i.e., VPI), and hence, may lead to increased Capp. Because speech abnormalities associated with VPI are noticeable to the listener and have been associated with negative reactions by listeners (Blood & Hyman, 1977; Havstam et al., 2011; Watterson et al., 2013), this social rejection by peers and potentially other members of society with whom the child with VPI interacts, may increase levels of Capp. Thus, children with VPI may be particularly vulnerable to Capp as a result of being socially devalued, because social acceptance by peers is important during middle childhood and early adolescence (Berk, 2003).

According to the literature, Capp may be logically related to a variety of social and communicative functions in children with and without speech disorders (Dzioba et al., 2012; Horwitz, 2002; McCroskey & Daly, 1976). Correlational analyses may unravel how different dimensions of social and communicative functioning may interact with

levels of Capp experienced in children. Therefore, the interplay between the Capp construct, in addition to other communication constructs (i.e., Catt and speech satisfaction) and functional abilities such as social competence were explored in the present study for the combined cohort of children (VPI + control group). Furthermore, a separate in-depth exploration of these interrelationships for the VPI group only was also undertaken. Separate analyses permitted the desired exploration of potentially unique relationships between Capp experiences and other communication constructs and functional abilities in children with VPI to be identified. A discussion of these results followed by exploration of these interrelationships for the VPI group only is provided in the following sections.

4.3 Associations between Communication Apprehension and Social and Communicative Function for the Combined Cohort

The second research question posed was whether relationships exist between Capp and other psychosocial constructs including Catt, speech satisfaction, and social competence in a combined cohort including individuals with and without speech disorders (i.e., children with VPI). Utilizing combined cohort data permitted a comprehensive examination of the construct of Capp in the population broadly conceived. Hence, the combined cohort data may potentially advance existing literature based predominantly on the portion of the population without speech disorders. Intercorrelations between Capp and all social-communicative constructs addressed herein were found to be significant for the combined cohort data, including its relationship to social competence, speech satisfaction, and Catt. As such, these results support both existing literature and logically implied relationships between Capp and social and communicative functioning in a broad population of children. Relationships found between Capp and each of the aforementioned constructs (i.e., social competence, speech satisfaction, Catt) for the combined cohort data will be discussed accordingly below.

4.3.1 Communication Apprehension and Social Competence

A moderate negative relationship between Capp and social competence (r = -.39) was identified for the combined cohort of children. As such, increases in Capp were found to be associated with decrements in social competence. Previous research supports the relationship between Capp and social competence (Horwitz, 2002; McCroskey, 1977). Capp has been found to correlate moderately with overt behaviors of reduced social skill such as withdrawing from social interaction, avoiding communication situations, and exhibiting communication disruptive behaviors for the purpose of terminating an interaction (Daly & McCroskey, 1984; McCroskey, 1977). In addition, broader social difficulties including problems maintaining friendships (McCroskey & Daly, 1976) and pursuing fewer romantic relationships (McCroskey & Sheahan, 1978) also have been evidenced in those with Capp, further validating that decrements in social competence may persist in individuals with Capp. Since both constructs have a social element (Capp evaluating more of an *internalized* cognitive reaction to social situations and social competence assessing more *overt* behaviors in varied social contexts), a relationship between the broad constructs of Capp and social competence is theoretically supported. Furthermore, given the finding of a significant relationship between Capp and social competence, such a relationship is also empirically supported. However, due to the design of the present study, the directionality of this relationship is unknown.

It is plausible that the relationship between Capp and social competence is bidirectional in nature. Individuals who are fearful of oral communication in social settings may actively limit their interactions. This in turn may result in decreased opportunities to develop social skills and reduce social competence over time. Alternatively, an individual who exhibits poor social skills may become fearful of engaging with others due to concerns about being unable to successfully initiate and maintain a communicative interaction (Kougl, 1980). Taken together, the relationship between Capp and social competence may be cyclical in nature, each reinforcing the other (i.e., increases in Capp resulting in reduced social competence and vice versa). However, given that only a moderate relationship between Capp and social competence was identified in the present study, Capp and social competence may be *indirectly* related to one another.

Results of partial correlational analyses suggest that Catt may be mediating the relationship between Capp and social competence in the combined cohort of children. After controlling for Catt, the significant zero-order correlation between Capp and social competence was weakened in strength and became nonsignificant. As such, in the broader sample of children (i.e., VPI and typically developing children), Catt had a diminishing effect on the interrelationship between Capp and social competence. This finding suggests that Catt seems to be influencing associations between Capp and social competence in children. Similarly, additional factor(s) such as social acceptance by peers, and cognitive processes, may also influence relationships between Capp and social competence in children, as suggested in the literature.

Previous research has found that when compared to individuals with less Capp, those with Capp are perceived by others as less socially attractive and less desirable as communication partners (McCroskey & Daly, 1976; McCroskey et al., 1975; McCroskey, Hamilton, & Weiner, 1974). These decrements in social acceptance may be internalized by a child with Capp, simultaneously leading to limitations in social participation [and ultimately reductions in social competence (Beauchamp & Anderson, 2010)] and increased feelings of apprehension. Intact social cognition contributes to social competence (Beauchamp & Anderson, 2010), and hence, may influence the relationship between Capp and social competence in children. Studies indicate that individuals with Capp have difficulties devising cognitive plans for expected social interactions, suggesting that limitations in social cognition also may be present in individuals with Capp (Buhr et al., 1991; Greene & Sparks, 1983). Hence, reduced social cognition may influence relationships between Capp and social competence. In sum, given that only a moderate correlation was found between Capp and social competence for the combined group of children in the present work, it is plausible that other factors such as Catt, social acceptance of peers, and social cognition, may influence their relationship between Capp and social competence.

Overall, because Capp and social competence are both multidimensional constructs, a complex, indirect, relationship may exist between them. In fact, Beauchamp and Anderson (2010) integrate a multitude of cognitive, emotional, linguistic, and

communication skills, as well as internal and environmental factors that mediate these skills, into their model of social competence. Similarly, a multi-causal explanation to the development of Capp was posited by Condit (2000), indicating that biological, environmental, developmental, cognitive, cultural, and genetic factors contribute to Capp. Indeed, given the varied factors that may influence the development of both Capp and social competence, a complex reciprocal relationship between Capp and social competence likely exists (Condit, 2000; Horwitz, 2002). The present study investigated one factor that may be influencing associations between Capp and social competence, that of Catt. In addition, based on logical inferences construed from a review of the literature, other factors (i.e., social acceptance, social cognition) also may be contributing to the relationship between Capp and social competence in children. As such, an intricate association between Capp and social competence, mediated by multiple factors both internal and external to the child, is posited.

Finally, the scoring of the social competence instrument utilized in the present study (i.e., HCSBS) may have contributed to the somewhat lower than expected relationship between Capp and social competence for the combined cohort. For purposes of the current exploratory study, the total social competence score was used in the correlational analyses rather than each of the subscales, peer relations (PR) and self-management/compliance (SMC) separately. However, the construct of Capp and the items of the PR subscale have more conceptual similarities than Capp and the SMC subscale, and therefore, the former might have been expected to have a stronger relationship than the latter. Furthermore, given the diverse comorbidities present in children with VPI, issues of self-management and compliance may have received higher ratings than issues related to peer relations. As such, higher SMC scores may have skewed total SC scores, reducing the magnitude of the correlation between Capp and social competence in the combined cohort of children. Exploration of descriptive statistics of the PR and SMC scores identified some interesting individual differences in subscale scores for children in the control group and VPI group.

According to the HCSBS manual, PR and SMC scores falling between the 20^{th} and 5^{th} percentiles indicate children at risk for social functioning and further evaluation of social

skills is recommended. Scores below the 5th percentile indicate children who are likely to have poor social functioning. For the PR subscale, all 20 children in the control group and 15 of the children in the VPI group fell in the same range of scores, while 5 children with VPI fell substantially outside the rest. Of these 5 children with VPI, the lowest scorers (i.e., below 15th percentile) tended to be children presenting with a syndrome. For the SMC subscale, somewhat less of an overlap in scores was identified between cohorts, with 18 children in the control group and 12 children in the VPI group revealing overlapping scores; once again, 5 children with VPI scoring significantly outside these ranges of scores (i.e., <15th percentile). Although most of the children who scored low on the SMC scale were the same children who received a low score on the PR subscale, several children had significant problems with SMC only or PR only. Interestingly, of the children with VPI who presented with significant problems in social competence, all children with a syndrome had difficulties with both peer relations and self-management/compliance. Overall, many but not all children with VPI had problems in one or both prosocial behaviors, PR and SMC. As such, individualized relationships between HCSBS subscale scores, mediated by other health factors (i.e., syndromes) may be present in children with VPI. These complex, individualized relationships, may have contributed to the somewhat lower than expected relationship found between Capp and social competence in the combined cohort of children. In sum, issues related to the type of prosocial behaviors evaluated may have contributed to the finding of only a moderate relationship between Capp and social competence in the combined cohort of children.

4.3.2 Communication Apprehension and Speech Satisfaction

A weak positive correlation between Capp and speech satisfaction ($r = .27$) was identified for the combined cohort of children. This suggests that, at least to a small degree, increased apprehension toward communication is associated with less satisfaction with speech. Limited variability in speech satisfaction scores may have contributed to the limited association between Capp and speech satisfaction found for the combined cohort of children with and without speech disorders (i.e., VPI). Both groups of children reported overwhelmingly positive or neutral levels of satisfaction towards their speech. Hence, the limited variability in responses to the speech satisfaction measure found in the

present study may have prevented a stronger relationship between Capp and speech satisfaction from being identified. Alternatively, participants may not have understood what was meant by "speech satisfaction" in the context of the present study. Although the single-item speech satisfaction instrument was phrased in clear, age-appropriate language (i.e., "overall, how happy are you with your speech?"), the possibility exists that children did not fully or accurately comprehend what was being asked of them and/or were incapable of reflecting on their perceived level of speech satisfaction.

No previous studies have explored associations between Capp and speech satisfaction. However, a distinction between these constructs can be theorized (Rubin & Rubin, 1989). Capp is a construct that involves feelings towards *interacting with others* in varied communication situations. In contrast, satisfaction with speech is a more discrete construct involving self-reflections of one's *own speech or speaking ability*, rather than interactions with others alone. The shared characteristics of Capp and speech satisfaction may be related as they are both *internalized* constructs addressing *affective states* (i.e., feelings) related to communication; although speech satisfaction addresses only one aspect of communication (i.e., the act of speaking), Capp encompasses broader aspects of communication.

In addition, results of partial correlational analyses conducted in the present investigation, suggest that Catt may be influencing the relationship between Capp and speech satisfaction in the combined cohort of children. After controlling for Catt, significant zero-order relationships between Capp and speech satisfaction were weakened in strength and became nonsignificant. As such, the diminishing effect that Catt had on interrelationships between Capp and speech satisfaction suggests that Catt may be mediating relationships between Capp and speech satisfaction in the combined cohort of children. Overall, only weak relationships between Capp and speech satisfaction were identified in the present study. In contrast, stronger relationships between Capp and another communication-orientation construct, Catt, were found for the combined sample of children.

4.3.3 Communication Apprehension and Communication Attitude

A moderately large correlation (r = .63) between Capp and Catt was found for the combined group cohort of children. As such, increases in Capp were associated with more negative attitudes towards speech. Although no previous investigations on the relationship between Capp and Catt have been conducted, Vanryckeghem and Mukati (2006) identified a moderate correlation (r = .45) between Catt and the emotional response scale of the Speech Situation Checklist (SSC) in typically developing children between 8 and 11 years. The SSC evaluates the extent to which certain communication situations bring about negative emotions (e.g., fear, anxiety, worry, etc.), a measure that is similar in concept to Capp. Hence, the study by Vanryckeghem and Mukati (2006) corroborates the relationship between Capp and Catt found in the present study. The moderately large correlation between Capp and Catt identified suggests some shared characteristics between these two constructs, and some that are unique to each.

Conceptually, Capp and Catt would appear to share some characteristics in that both are internalized *cognitive* constructs, namely, *self-appraisals* of *communication* traits that develop at an early age (Garrison & Garrison, 1979; McCroskey, 1977; Vanryckeghem & Brutten, 2007; Vanryckeghem et al., 2005; Wheeless, 1971). However, several conceptual distinctions can also be made between Capp and Catt. First, Capp addresses negative *feelings* of apprehension associated with speaking and communicating with others, thus, targeting both cognitive and (predominantly) *affective* states of an individual (McCroskey, 1977). In contrast, Catt reflects on negative thoughts and beliefs regarding speech, and hence, is predominantly *cognitive* in scope (Vanryckeghem & Brutten, 2012). This distinction suggests that although Capp and Catt both may encompass cognitive and affective elements, the relative focus of each construct is different, with Capp addressing more affective components of communication, and Catt addressing more cognitive reflections.

Second, Capp is a *multidimensional* construct, while Catt is a more focused, singular concept. A recent principal component analysis (PCA) of MECA-R items on a group of 87 children (77 typically developing, 10 with VPI) between the ages of 8 to 14 years,

identified four factors underlying the MECA-R, labelled “public speaking”, “talking with unfamiliar individuals”, “talking with authority figures”, and “talking in a group” (Dzioba et al., 2014). Results of the PCA by Dzioba et al (2014), in addition to previous factor analysis studies of the original MECA (Garrison & Garrison, 1979; Hutchison & Neuliep, 1993b), suggest that the MECA-R, and thus, Capp, evaluates multiple speaking contexts that may occur with a variety of communication partners. In contrast, factor analysis of the CAT, in addition to parallel versions of the CAT for adults and preschool children, have consistently found that one factor, *speech difficulty*, seems to underlie the CAT, and hence, Catt (Clark, Conture, Frankel, & Walden, 2012; DeKort, 1997; Vanryckeghem & Brutten, 2012). As such, Catt seems to evaluate children’s perceptions of speech effort and its associated communication challenges, while Capp evaluates a child’s perceptions and underlying feelings when speaking in a variety of contexts. Overall, Capp appears to represent a broader communication variable than Catt.

Results of the partial correlational analyses conducted in the present investigation suggest that Catt is influencing Capp experiences in all children in the cohort. Thus, children’s belief that speech is difficult (i.e., negative speech-associated attitudes), may bring about apprehensive feelings towards communication. Indeed stronger associations between social-communicative constructs and Catt were found for the combined cohort of children. Consequently, additional discussion of these relationships is merited.

4.4 Associations between Communication Attitude and Social and Communicative Function for Combined Cohort

A significant moderate relationship ($r = -.45$) was found between Catt and social competence for the combined cohort, suggesting that more negative speech-associated attitudes are associated with decrements in social competence. No previous work has been conducted on the association between Catt and social competence. It can be speculated that a child’s belief that speech is difficult may result in a child being less willing to participate in verbal exchanges with communicative partners; these negative beliefs regarding communicative function may result in diminished confidence regarding communication performance, which may ultimately translate to reduced social

competence. Alternatively, past experiences of poor social interactions may bring about the belief that speaking and interacting with others is difficult (i.e., negative Catt). Negative reactions of listeners to the speech of a child, may be internalized by a child and result in the formation of negative speech-associated attitudes. At the same time, the reduced social acceptance that a child experiences may lead to less opportunities for social participation, which may ultimately lead to reduced social competence over time (Beauchamp & Anderson, 2010). Furthermore, as hypothesized above, utilization of HCSBS total scores rather than subscale scores may also have depressed the magnitude of the relationship between *Catt* and social competence found for the combined cohort of children (see section 4.3.1). Differential experiences in PR and SMC scores may have skewed the overall SC score, potentially reducing the correlation between social competence and Catt found for the combined group data.

In addition to the association between Catt and social competence, a significant moderate correlation between Catt and speech satisfaction ($r = .48$) was found for the combined cohort of children. As such, more negative attitudes toward communication were associated with less satisfaction with speech. Theoretically, the construct of Catt and the construct of speech satisfaction both measure speech-related concepts from the child's perspective. It is then intuitive that a child's appraisal of speech difficulty (as assessed by the CAT) would inherently be related to a child's overall satisfaction with their speech; reflections related to the child's own speech are captured in both the Catt and speech satisfaction construct. Given that the speech satisfaction measure is comprised of a single item, it is possible that speech satisfaction may be tapping some aspect of Catt; hence, the "speech satisfaction" measure may reflect a component of the broader construct of Catt.

Overall, stronger associations between Catt and social and communicative functioning were identified for the combined cohort of children than for associations between Capp and social and communicative functioning. As such, unexpectedly, a child's speech-associated attitude was found to be associated with a child's day-to-day functioning to a greater extent than Capp. With the exception of normative studies, the Catt construct has almost exclusively been applied to speech disordered populations in the literature (De Nil & Brutten, 1990; Havstam et al., 2011). As a result, it is interesting and somewhat

unexpected, that Catt, rather than Capp (which has been extensively applied to broad populations of individuals), was found to have stronger associations with the social and communicative functioning of children with and without speech disorders in the present study. It follows then that Catt may be an important construct to study in childhood populations. Several reasons for the relatively stronger relationships found between Catt (rather than Capp) and social and communicative functioning in children, including children with VPI, may be posited.

The greater associations found between Catt and the social-communicative constructs for the combined cohort (compared with Capp and the social-communicative constructs), may be attributed to the instruments administered. That is, greater internal consistency on the CAT was identified in the present study than for the MECA-R. Hence, the difference in the strength of the associations with these constructs may be attributed to a more psychometrically robust instrument utilized for the Catt construct (i.e., CAT) than for the measure utilized to assess Capp (i.e., MECA-R).

Alternatively, differences in the level of self-reflection required to accurately report on one's experience of Catt and Capp may also have contributed to the greater association found between *Catt*, rather than Capp, and social-communicative constructs in the combined cohort of children. It is plausible that substantial insight into one's self may be required to reflect on how one *feels* (i.e., Capp) when engaging in or anticipating interactions with one or more individuals. In contrast, relatively less insight may be required to report on one's attitude towards their speech. As such, Capp may be a more abstract concept for children to reflect on compared to the concept of Catt. Regardless, the overall finding of the present study is that Catt, rather than Capp, is more strongly associated with social and communicative functioning in the combined cohort of children.

4.5 Associations between Communication Apprehension and Social and Communicative Function in Children with VPI

Based on data gathered, much was learned about Capp in general by studying the full cohort of children including that Catt was more strongly related to everyday functioning than Capp. Yet the functioning of children with VPI was of particular interest. Thus, as a subset of the second research question posed in the present study, an in-depth exploration of relationships between Capp and other psychosocial constructs (i.e., social competence, speech satisfaction, communication skills, and Catt) in children with VPI only were undertaken. For the subset of children with VPI, relationships between Capp and social-communicative constructs did not reach statistical significance. The only exception was a significant relationship between Capp and Catt.

4.5.1 Communication Apprehension and Social Competence

A low nonsignificant negative relationship ($r = -.23$) was found between Capp and social competence for children with VPI only. Conceptually, the multi-faceted nature of both constructs (i.e., social competence and Capp) (Beauchamp & Anderson, 2010; Condit, 2000) (see section 4.3.1.), would suggest that multiple factors contribute to the development of both Capp and social competence. Thus, a complex, indirect relationship between Capp and social competence, mediated by other factors may exist. The relatively low sample size of the VPI group (i.e., 20) may have contributed to the present finding of no association between Capp and social competence for children with VPI. In addition to these limitations, the non-significance of the relationship between Capp and social competence in children with VPI may be attributed to other factors.

The heterogeneity of the functional abilities and health status of children with VPI who participated in this study also may have contributed to the nonsignificant relationship. Given that heterogeneity is typical in populations of children with VPI, multi-path relationships between Capp and social competence, mediated by a multitude of health factors are posited. For children in the VPI group, co-occurring health factors may be confounding the logically deduced relationship between Capp and social competence. As

such, in children with VPI, the relationship between Capp and social competence may be complex and individualized. For example, presence of teasing related to speech characteristics, facial disfigurement (or both), and the subsequent potential for poor social acceptance by peers, may influence relationships between Capp and social competence in some children with VPI. Literature on children with VPI/CLP (i.e., Havstam et al., 2011; Nash et al., 2001; Noor & Musa, 2007), suggests an increased vulnerability to social rejection in children with VPI. Although the prevalence of teasing related to facial difference was not directly assessed in the present study, one item on the CAT inquired about teasing related to speech; this question revealed that 7 of 20 children with VPI indicated being made fun of by their peers. However, 13 of the 20 children with VPI reported not being made fun of by their peers; thus, teasing was not experienced by all children with VPI. Heterogeneity in speech dysfunction and presence of facial disfigurement may explain why some children with VPI reported being teased, while others did not. As such, social rejection may indirectly influence relationships between Capp and social competence in some children with VPI, but this relationship may be obscured by the heterogeneity of speech and facial disfigurement found in the sample of children with VPI who participated in the present study.

Alternatively, another factor that may influence relationships between Capp and social competence in children with VPI may be the resilience characteristics of these individuals. Resilience may be defined as patterns of positive adjustment in the context of risk or adversity (Luther, Cicchetti, & Becker, 2000). In the case of VPI, risk for adjustment difficulties may be related to experiences due to a physical identifiable cleft, speech abnormalities, or cognitive delays. Although personal resilience may also influence the relationship between Capp and social competence for the combined cohort of children, given that children with VPI may be more vulnerable to social rejection, resilience may play a larger mediating role in the relationship between Capp and social competence for children with VPI (Demir et al., 2011; Endriga, Jordan, & Speltz, 2003; Feragen, Borge, & Rumsey, 2009; Feragen, Kvalem, Rumsey, & Borge, 2010; Richman et al., 1985). In a study examining 10 year old children with CLP, resilience was associated with adequate emotional functioning, strong friendships, social acceptance, and a lower frequency of reported teasing (Feragen et al. 2009). Hence, resilient traits

may offset the potential social rejection associated with facial and speech abnormalities, thereby indirectly influencing social competence in children. Although research on children with CLP often points to decrements in social skills of children with VPI/CLP (Dzioba et al., 2013; Frederickson et al., 2006; Noor & Musa, 2007), most of the children with VPI in the present study (n = 15) had average to high levels of social competence. As a result, resilience may have contributed to the development of adequate social competence in some children with VPI in the present study. At the same time, resilient characteristics may work to help children with VPI regulate emotions (Feragen et al., 2009), working to reduce the negative affective states associated with the experience of Capp.

In addition, lack of an association between Capp and social competence in children with VPI may be attributed to difficulties of children with VPI being able to reflect on their internalized feelings (i.e., feelings of Capp). For example, descriptive data of the responses of children with VPI indicate that a MECA-R score of 42, representing moderate levels of Capp, was associated with SC total scores as diverse as 111 and 150; conversely, a MECA-R score of 61, representing high Capp, was associated with a SC total score of 140, indicating high social competence. As such, children with VPI may not be adept at gaging their internalized feelings towards communication.

Finally, as described in section 4.3.1, utilization of the total SC score of the HCSBS instrument for correlational analysis also may have contributed to the lack of relationship between Capp and social competence for the VPI group data. Children with VPI may have received higher ratings by parents on the SMC subscale than the PR subscale, skewing the overall SC score. Descriptive data of PR and SMC scores for the VPI group suggest that while many children had difficulties related to both PR and SMC, some had difficulties in only one domain of functioning (i.e., PR or SMC only). Hence, use of the overall SC total scores as opposed to the subscale scores may have contributed to the nonsignificant relationship found between Capp and social competence in children with VPI. Overall, the present data suggest that MECA-R scores alone do not seem to be associated with the social competence of children with VPI. Similar results were

revealed for the relationship between Capp and speech satisfaction in children with VPI only.

4.5.2 Communication Apprehension and Speech Satisfaction

Correlational analyses of the VPI group data indicated no relationship between Capp and speech satisfaction. Limited variability in the level of speech satisfaction reported by children with VPI likely contributed to the lack of relationship found between this construct and Capp in children with VPI. The majority of children in the VPI group reported positive or neutral levels of satisfaction towards their speech, with only one child in the VPI group indicating that they were "very unhappy" with their speech[5]. This finding is not consistent with work by Demir et al. (2011) who reported that 70% (n = 14) of children with CLP were dissatisfied with their speech, while only 30% (n = 6) reported being satisfied with their speech. As such, sampling a larger cohort of children with VPI may have resulted in a greater distribution of scores on the speech satisfaction measure, potentially leading to a stronger relationship between Capp and speech satisfaction being identified. Alternatively, and as reported previously, the lack of association found between Capp and speech satisfaction may be a result of participants having difficulty understanding and reflecting on their level of speech satisfaction. Hence, children with VPI may lack the insight necessary to gage how satisfied they are with their speech.

In addition, Catt may influence the relationship between Capp and speech satisfaction in children with VPI. Partial correlations, holding Catt constant, revealed an increase in the magnitude of the relationship between Capp and speech satisfaction, from a negligible zero-order correlation to one of moderate level. This suggests that the relationship between Capp and speech satisfaction is influenced by Catt in children with VPI. However, given the exploratory nature of this study, caution should be taken in

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[5] The "very unhappy" response on the speech satisfaction measure represented a 9 year old male with nonsyndromic cleft palate. This child was reported to have "Average" social competence, was communication impaired (GCC sum < 55), but had no learning disability according to parent report, in addition to reporting an average MECA-R score and a negative communication attitude. As such, no evidence of unreliability was identified for this data point, and hence, it was included in the correlational analyses of the present study.

generalizing these findings to the population of children with VPI. Overall, results of the present study do not support the existence of a relationship between Capp and speech satisfaction in children with VPI.

4.5.3 Communication Apprehension and Communication Skills

Results of correlational analysis found a nonsignificant association between Capp and communication skills in children with VPI as measured by the CCC-2. As such, a relationship between Capp and communication performance could not be identified in children with VPI. To date, no research has been conducted on how Capp and communication skills might correlate in children with VPI. Based on results of the present study, a relationship between Capp and communication skill could not be identified in children with VPI. Accordingly, it is plausible that an individual with VPI may experience Capp, but that these internalized thoughts and feelings cannot be observed by an outsider; hence, they do not translate to decrements in communication behaviors. Given the broad scope of communication behaviors measured by the CCC-2, (semantics, syntax, pragmatic abilities, etc.), results of the present study suggest that Capp may not be related to overall communication performance, as reflected by the GCC score, of a child with VPI; however, more discrete aspects of communication behavior may be linked in these children. For example, the present data revealed that children with communication impairment (i.e., GCC < 55) were more impaired in linguistic aspects of communication, that is, sentence structure or sound production, than for pragmatic or social aspects of communication. Hence, associations between Capp and more discrete aspects of communication such as core linguistic abilities or pragmatics may exist in children with VPI.

For the current participants with VPI, parent-ratings of communication skill identified a broad range that varied from significant communication impairment to good communication skill in core language skills and pragmatic aspects of communication. The diversity of scores on the communication measure (CCC-2) observed supports the conclusion that a relationship between Capp and communication skill may not exist in children with VPI. From a clinical perspective, although children with VPI may be

evaluated to have good language skills and pragmatic aspects of communicative abilities, psychological difficulties such as Capp may persist in the absence of observable evidence. Hence, the present findings suggest that there is no association between Capp and communication skills.

4.5.4 Communication Apprehension and Communication Attitude

A moderate correlation (r = .47) between Capp and Catt was identified within the VPI subgroup data. Results of partial correlational analyses suggest that Catt is likely influencing levels of Capp in children with VPI. For children with VPI, awareness of speech difficulty may bring about a negative speech-related attitude (Vanryckeghem & Brutten, 2007). Descriptive analyses of CAT scores identified many children in the VPI group who exhibited negative attitudes towards their communication. Negative attitudes about one's speech and communication may reinforce feelings of inadequacy when interacting with others. If a child believes communication is difficult, Capp may develop. This logical relationship between Capp and Catt in children with VPI is empirically supported by the present findings.

In sum, with the exception of the relationship between Capp and Catt, results of correlational analyses utilizing the VPI group data only identified that intercorrelations between Capp and other social-communicative constructs were nonsignificant. However, Catt was more strongly associated with the social and communicative functioning of children with VPI only; as such, a discussion of these relationships is warranted in the subsequent section.

4.6 Associations between Communication Attitude and Social and Communicative Function in Children with VPI

Similar to the relationship between Capp and social competence, no significant relationship between Catt and social competence was found in children with VPI. Descriptive data of measures of central tendency on subgroupings of children with VPI according to presence/absence of a syndrome (see Table 6) does not appear to link Catt

and social competence experiences in children with VPI. Descriptively, similar average CAT scores (Means, Medians) were found for children with a syndrome and children without a syndrome, whereas children with a syndrome had lower social competence scores than children without a syndrome (Table 6). However, a few trends emerged when descriptive data of central tendency of subgroupings of children with VPI according to etiology (see Table 5) were explored. Children with CLP tended to score lower on the CAT (reflecting more positive attitudes toward speech) and received higher SC total scores (reflecting higher social competence), children with 22q.11 deletion syndrome tended to report more negative communication attitudes and lower SC total scores, while children in the "unknown" subgroup tended to score in the middle on both the CAT and HCSBS. Therefore, the possibility exists that a more complex, indirect relationship between Catt and social competence, mediated by health factors such as etiology of VPI, may be present in children with VPI. Overall, it is speculated that variability in comorbidities and health factors may be influencing relationships between Catt and social competence in children with VPI, leading to multi-path, individualistic relationships between these constructs. Hence, *combinations* of health factors (i.e., cleft type, presence of facial disfigurement, learning disability, speech severity, etc.) may be influencing relationships between Catt and social competence in children with VPI.

Similar to results of correlational analyses between Capp and communication skills, correlations between Catt and communication skills as measured by the CCC-2 also were not found to be significant for children with VPI. No previous work has investigated associations between Catt and communication skills in children with VPI. Based on results of the present study, it would appear that a child's attitude towards speech is not associated with parent's appraisal of their child's overall communication performance. For example, children with VPI who reported low scores (i.e., <10) on the CAT, a score that reflects a relatively positive attitude towards speech, had standardized GCC scores as diverse as 42, representing communication impairment and as high as 70, reflecting good communication skills. Similar distributions of GCC scores were found for children who reported negative speech-associated attitudes (i.e., CAT scores > 20). Although children with VPI may experience negative attitudes towards communication, these negative beliefs may or may not actually be related to their observable speech, language and

conversational behaviors. Once again individual variation among these children is apparent. Hence, is it possible that complex, individualized relationships between Catt and communication skills exist in children with VPI; multiple health factors (i.e., facial disfigurement and presence of syndrome) also may combine and differentially influence internalized communication attitudes and externalized communication behaviors (i.e., communication skills) of children with VPI. However, as postulated throughout this discussion, another potential explanation for the lack of association found between Catt and communication skills may be related to the self-reflection abilities of children with VPI. That is, children with VPI may have limited insight into their thoughts and attitude towards their speech and communication. Although communication skills were not associated with Catt, communication skills were found to be associated with social competence in the present study.

A strong positive correlation between communication skills (CCC-2) and social competence ($r = .68$) also was identified, suggesting that better linguistic abilities and knowing how to use them appropriately are associated with increases in social competence. A relationship between communication skills and social competence is consistent with previous research suggesting that development of good communication skills is integral to the formation of adequate social competence (Beauchamp & Anderson, 2010; Ketelaars et al., 2010). Specific to children with CLP, past literature suggests that communication skills are related to social functioning (Murray et al., 2010). Murray et al. (2010) found a moderate negative relationship (-.49) between communication skills (i.e., CCC-2 completed by teachers) and social difficulties (i.e., through observations of social interactions and role play with dolls) in seven-year-olds with cleft lip and/or palate. Although the present investigation found a stronger relationship between communication skills and social competence than that identified by Murray et al. (2010), nonetheless, both studies point to increases in social competence with increases in communication skill in children with CLP/VPI. Overall, communication skills of children with VPI were found to be more strongly related to behaviors related to social interaction than to children's internalized feelings regarding those behaviors (i.e., Catt).

Finally, a significant moderate correlation between Catt and speech satisfaction was found for the VPI group data (r = .52), indicating that a more negative attitude toward communication was associated with more neutral levels of satisfaction with speech (as opposed to higher levels of satisfaction with speech). Recent work by Havstam et al. (2011) investigated the relationship between Catt and speech satisfaction in children with CLP. Although satisfaction with speech was evaluated from a parent's perspective, a moderate correlation between child reported Catt (as evaluated by the CAT) and speech satisfaction (r = .45) was found in 10 year old children with CLP, indicating less satisfaction with speech with more negative appraisals of Catt. In the Havstam et al. (2011) study, a greater distribution of speech satisfaction scores were found, covering the entire rating scale from very satisfied to very dissatisfied. In contrast, and with the exception of one child, the present investigation found neutral to positive levels of satisfaction as reported by children with VPI. These differences in the distribution of satisfaction scores between the aforementioned studies may be attributed to discordance between parent and child rated evaluations of speech satisfaction. Nonetheless, findings from both studies support the conclusion that a relationship between Catt and speech satisfaction exists in children with VPI (including children with VPI associated with CLP).

Overall, results of correlational analyses between social-communicative constructs in both sets of data, suggests that Catt appears to be contributing to the social and communicative functioning of children, including children with VPI, to a greater extent than Capp. As such, data suggest that Catt may be a more important communication construct to study in children with VPI. However, the magnitude of associations between the communication orientation constructs (i.e., both Capp and Catt) and social-communicative constructs were of lesser magnitude for the VPI only subset of data when compared to combined cohort data. Therefore, the potential exists that children with VPI may have difficulties reflecting on their feelings towards communication (i.e., Capp) and (to a lesser extent) their attitudes toward communication in general. To identify whether these communication orientation constructs (i.e., Capp and Catt) may also relate to the speech performance of children with VPI, further correlational analyses were undertaken.

4.7 Associations between Communication Constructs and Speech Severity in Children with VPI

The third research question posed in the present study addressed whether relationships exist between communication orientation constructs (Capp and Catt) and speech severity. Nonsignificant relationships between Capp and speech functions and moderate significant relationships between Catt and speech severity were identified. Previous research on relationships between Capp and speech severity in children with VPI, in addition to children with other speech disorders, has been inconclusive. Dzioba (2008) found moderate relationships between Capp and hypernasality (r = .30) and nasal air emission (r = .32), suggesting increased feelings of apprehension were associated with greater decrements in speech in children with VPI; however, and perhaps given the small sample size in that study (n = 14), these relationships did not reach significance. Several factors may have contributed to the nonsignificant relationship found between Capp and speech severity in children with VPI, including the limited variability in speech severity scores of children with VPI, and health factors related to treatment of VPI (e.g., speech therapy and/or surgical treatment for VPI).

First, the distribution of speech severity scores of the ACPA for children in the VPI group were somewhat limited and this may have contributed to the nonsignificant findings between Capp and speech severity found in the present study. Just over half of the children in the VPI group (n = 11 and n = 13, respectively) were perceptually judged to exhibit significant disruptions in their speech [i.e., ACPA score of 4 (moderate) to 6 (severe)] for speech characteristics of hypernasality and nasal air emission. In addition, only 4 and 5 children exhibited moderate to severe decrements in articulation proficiency and overall intelligibility, respectively; only 2 children with VPI in the present study received a score of 6 (severe) on ratings of articulation proficiency, and no children were judged to present with severely unintelligible speech. Obtaining a cohort of children with VPI who exhibited a broader range of speech severity, from mildly to severely disordered speech characteristics (i.e., ACPA scores from 2 to 6), may have resulted in a stronger association between speech severity and Capp than was found in the current study.

Second, treatment factors (i.e., speech therapy and/or surgical correction) may have influenced study results. Speech functions of children in this clinical population are known (as a result of speech therapy or surgical procedures) to improve as a function of age (Havstam et al., 2011; Pulkkinen, Haapanen, Paaso, Laitinen, & Ranta, 2001; Ruiter, Korsten-Meijer, & Goorhuis-Brouwer, 2009). As such, interplay between age, speech therapy, surgical treatment and speech function likely exists in children with VPI. Hence, some children with VPI may have presented with improved (although still impaired) speech at the time of study administration, but they also may have had a previous history of severely impaired speech functions. Conversely, literature on Capp suggests that Capp represents a more stable trait that may develop early in life (Garrison & Garrison, 1979; Wheeless, 1971). Therefore, severe speech dysfunction at a younger age may have contributed to Capp development. Although speech impairments may have improved in some children with VPI, underlying psychological difficulties (i.e., Capp) that may have developed earlier in life may persist. This may explain why some children with VPI in the present study who presented with mild speech severity scores still reported high MECA-R scores. For example, 5 children with VPI were judged by the SLP to exhibit mild hypernasality (ACPA hypernasality score = 2) at the time of data collection. Of these five children, all had a history of speech therapy; in addition, the three children with the highest Capp scores also had undergone a surgical procedure to correct their VPI. Although the degree of VPI may have improved, the psychological ramifications of the speech disorder (i.e., Capp) may have persisted.

In contrast to the present findings revealing no relationship between Capp and speech severity in children with VPI, moderate significant relationships between *Catt* and *speech severity* were identified. A moderate relationship between Catt and nasal air emission ($r = .39$), in addition to a moderate correlation between Catt and overall intelligibility ($r = .48$) was identified, indicating that perceptions of more severe nasal air escape and more unintelligible speech are associated with more negative attitudes towards their speech in children with VPI. In addition, moderate correlations between Catt and the other two speech variables assessed [i.e., hypernasality ($r = .36$) and articulation proficiency ($r = .36$)] were found, but these correlations did not reach significance. These data are consistent with previous work in children with CLP (Havstam et al., 2011) and children

with other speech disorders (i.e., stuttering) (Vanryckeghem et al., 2005). Relative to the population of children with CLP/VPI, Havstam et al. (2011) found significant low to moderate correlations between CAT scores and perceptual evaluations of speech functions (velopharyngeal function, articulation, intelligibility, general impression of speech) in children with CLP assessed at 5, 7, and 10 years of age. The low to moderate significant correlations between Catt and articulation (r = .29 to r = .39) found by Havstam et al. (2011) were comparable to the moderate, although nonsignificant, correlation between Catt and articulation proficiency (.36) in the present study. The correlation between Catt and overall intelligibility was somewhat higher in the present study (r = .48) than correlations between Catt and intelligibility found in Havstam et al. (2011) (r = .35 to r = .44), but was comparable to the correlation between Catt and general impression of speech found by Havstam et al. (2011) (r = .47). A general trend identified from both the present study and the study of children with CLP by Havstam et al. (2011) suggest greater associations between Catt and more global or holistic assessments of speech (i.e., overall intelligibility, general impression of speech), rather than more discrete aspects of speech (e.g., hypernasality, nasal air emission, articulation) in children with VPI/CLP. As such, global impressions of the speech functions of children with VPI by an SLP may have more clinical utility relative to providing a better indicator of the functional abilities of children with VPI compared to judgments of more discrete aspects of the speech characteristics of this population of children.

Overall, within the present study, Catt rather than Capp was shown to be more closely associated with speech functions of children with VPI. The reason why moderate correlations between Catt and speech severity were found, yet no relationships between Capp and speech severity were identified, may be explained on the basis of conceptual differences between the two constructs posited earlier. More specifically, given that Catt has been found to be a more singular construct that assesses children's impressions of speech difficulty (Clark et al., 2012; DeKort, 1997), it is not surprising that a child's thoughts and beliefs towards their speaking ability would be associated with the severity of their speech abnormalities. Communication attitude and speech severity likely mutually influence each other in a cyclical fashion, each construct further perpetuating the other (i.e., increases in negative attitudes towards communication resulting in more

decrements in speech functions, and vice versa) (Vanryckeghem et al., 2005). In contrast, Capp is a more multidimensional construct (Dzioba et al., 2012; Garrison & Garrison, 1979; McCroskey, 1977) that targets one's comfort with communicating orally in a variety of social settings, and as a result it may encompass broader notions of communication rather than ones that are specific to "speech" as a strict productive entity alone. Taken together, Catt was significantly associated with the speech functions of children with VPI while no relationships between Capp and speech severity were identified in children with VPI in the present study.

4.8 Study Limitations and Future Research Directions

As with any research endeavor, several limitations were identified in the present study. Most prominently, issues related to heterogeneity of the VPI group, and instruments administered to study participants are of importance. First, the somewhat disproportionate age distribution of children in the present study precluded any statistical comparisons between younger (i.e., 7 to 10 year olds) and older (i.e., 11 to 14 year olds) children from being conducted. Research suggests that children experience increases in both Capp and negative speech-association attitude with increases in age (Comadena & Prusank, 1988; Garrison & Garrison, 1979; Vanryckeghem & Brutten, 1997). Hence, the effect of age on the experience of Capp and Catt in children with VPI should be investigated in future work.

Issues related to the heterogeneity of children with VPI also may have influenced study results to some extent. The present sample of children with VPI included children with a variety of associated conditions including cleft palate only, cleft lip and palate, children with syndromes and children without syndromes. Although differential experiences in Capp, communi,cation attitude, speech satisfaction, and levels of social competence across these subgroupings of children with VPI were identified descriptively (see Tables 5 and 6), sample sizes were too small to compare statistically. Children in the VPI group also varied in the presence and extent of facial disfigurement. Given that facial appearance plays an important role in both the mental health (i.e., self-esteem, body image, etc.) and social functioning of children (Demir et al., 2011), identifying how

visually apparent facial disfigurement may have influenced the social and communicative functioning of children with VPI would have been beneficial. Furthermore, heterogeneity in other health factors in the VPI group (i.e., presence of learning disabilities, variability in communication skills, hearing abilities, etc.) was also evidenced. These factors have the potential to influence the day-to-day functioning of children with VPI (Dzioba et al., 2013). However, the inclusionary and exclusionary criteria that were set for study participants were fair and reasonable and resulted in a sample of study participants representative of the population of children with VPI. Future studies including a larger population from which natural subgroups may emerge for analysis is warranted. In addition, treatment for VPI (i.e., surgical procedures for VPI, speech therapy) may have had a confounding effect on study results. Longitudinal studies of communication-orientation experiences (Capp and Catt) before and after surgical correction of VPI and/or initiation of speech therapy to improve or eliminate the speech characteristics associated with VPI, may help clarify the relationship between speech severity, surgery, and communication predispositions in children with VPI.

Second, potential issues with cohort sampling should be noted. The limited variability in scores on the speech variables assessed using the ACPA may have prevented relationships between Capp and speech severity from being identified. Significant correlations may have been established between Capp and speech severity with a sample of children with VPI that represented all degrees of speech severity (i.e., mild to severe) at the time of data collection.

Third, perceptual evaluation of a more holistic judgment of speech function such as an "overall impression of speech" for children with VPI was not evaluated in the present study. Research suggests that more functional or holistic assessments of speech related to CLP/VPI were found to be associated with the social and communicative functioning of children to a greater extent (Havstam et al., 2011) than more discrete/clinical aspects of speech that underlie the ACPA. Havstam et al. (2011) utilized a speech variable entitled "General impression of speech" as part of their perceptual assessment in their study, which included "speech characteristics not typical of cleft palate" (p. 4). As such, the SLP was required to make a broad judgment of the speech of children with CLP/VPI. A

generalized impression of speech from the perspective of the SLP may have yielded stronger relationships between speech severity and communication orientation constructs (Capp and Catt) in the present study. Conversely, it has been posited that at least some of the children in the VPI group may have had difficulty engaging in the self-reflection necessary to accurately gauge their thoughts and feelings regarding communicating with others (i.e., Capp and Catt). Future research investigating the self-reflective abilities of children with VPI is clearly warranted.

In addition, future explorations may also focus on mediators and moderators of social and communicative functioning in children with VPI. The role that resilience may play in the development of social and communicative functioning of children with VPI may be an important area of research. The presence or absence of personal characteristics such as resilience may help identify why some children with VPI may present with adequate social and communicative functioning even in the presence of socially penalizing risk factors (i.e., speech impairment, facial disfigurement) (Endriga et al., 2003; Feragen et al., 2010). Furthermore, social acceptance and/or peer rejection has been speculated as a potential underlying factor in associations between the communication constructs (Capp and Catt) and social and communicative functioning in children with VPI throughout various sections of the current discussion (see section 4.3.1, 4.4, & 4.5.1) (McCroskey et al., 1974, 1975). Given that hypernasality has been associated with negative appraisals by the listener (Blood & Hyman, 1977; Watterson et al., 2013), and that teasing associated with speech impairment (and facial disfigurement) have been identified in children with CLP/VPI (Demir et al., 2011; Havstam et al., 2011), there is the potential that social devaluation may directly influence day-to-day functional abilities of children with VPI (Dzioba et al., 2013). The theme of social acceptance resonates throughout this investigation and discussion, suggesting that it may play an important role in generating a more complete picture of the relationship between functional abilities (i.e., social and communicative function) and the speech disorder (i.e., VPI) in children with VPI.

4.9 Conclusions

Results of the present study suggest that individuals diagnosed with VPI may experience limitations in multiple areas of functioning that extend beyond the primary physical dysfunction of the velopharyngeal port. Consistent with previous research, the present findings suggest that a multitude of functional aspects of one's daily life may be impacted by VPI (Barr et al., 2007; Skirko et al., 2012). When taking into account all correlational analyses conducted in the present study, it becomes apparent that a child's internalized impressions of communication (i.e., Capp and Catt) are associated with externalized behaviors of social competence in children, including children with VPI. Children with VPI, like all children with speech and language impairments, are at increased risk for being socially devalued (Van Riper, 1972). Furthermore, although the experience of Capp may be more pronounced in children with VPI, evidence suggests that Catt may play a more important role in the social and communicative functioning of children with VPI. Hence, assessment of the speech-associated attitudes of children with VPI, through administration of self-report instruments such as the CAT, may have important clinical utility. Given that the presence of negative speech-associated attitudes can interfere with communication and with the progress of speech therapy (Murphy et al., 2007), Catt may be an important construct to assess in the clinical setting in children with VPI. An association between Catt and speech performance was identified in children with VPI; as such, therapy targeted at modifying negative speech-associated attitudes may also contribute to the improvement of speech outcomes.

Overall, and consistent with previous research (Dzioba et al., 2013; Havstam et al., 2011; Zeytinoglu & Davey, 2012), results of the present study suggest the presence of great variability in the social and communicative functioning of children with VPI. While some children with VPI experienced decrements on all outcome measures evaluated, others presented with adequate social and communicative functioning. Failure to recognize this degree of individuality in how multiple features manifest in the context of VPI and communication related behaviors would run contrary to the present data. In conclusion, findings from the present study support the notion that comprehensive, yet

individualized clinical assessments of social and communicative profiles of children with VPI should be sought in this interesting and important clinical population.

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Appendix A

Glossary

22q deletion syndrome – a multiple anomaly syndrome caused by microdeletion of chromosome 22 at band q11.2; most common syndrome associated with VPI; syndrome also known as velocardiofacial syndrome (VCFS).

American Cleft-Palate Association Clinical Data Base Committee Speech Pathology Data Entry Form (ACPA) – standard rating tool in North America for perceptual assessment of speech related to velopharyngeal insufficiency.

Children's Communication Checklist – Second Edition (CCC-2) – instrument used to survey a child's broad communicative abilities; used to screen children for a variety of communication disorders.

Cleft lip and palate (CLP) – structural abnormalities affecting the lip and palate that result from failure of neural crest cells to migrate properly during in utero embryogenesis.

Cleft palate (CP) – structural abnormalities affecting the palate only that result from failure of neural crest cells to migrate properly during in utero embryogenesis.

Communication Apprehension (Capp) – level of anxiety or apprehension one feels towards communicating orally with a variety of communication partners.

Communication Attitude (Catt) – the propensity to evaluate one's speech and communication in a relatively positive or negative way.

Communication Attitude Test (CAT) – instrument developed to evaluate the attitudes of children towards communication.

General Communication Composite (GCC) – a composite representing the first eight subscales of the children's communication checklist-second edition (CCC-2); provides an overall assessment of communication skill; GCC scores less than 55 represent communication difficulty and GCC scores of 55 or greater represent good communication skills.

Home and Community Social Behavior Scales (HCSBS) – a measure of children's social behaviors and traits.

Measure of Elementary Communication Apprehension (Revised) (MECA-R) – tool developed to measure the experience of communication apprehension in different social situations of elementary school-aged children.

Peer Relations (PR) – subscale of the social competence (SC) scale; addresses behavioral characteristics important for making friends and being well-liked by children.

Pierre Robin Sequence (PRS) – developmental disorder characterized by a constellation of abnormally small/retracted mandible, downward displacement/retraction of the tongue, and cleft palate.

Self-Management/Compliance (SMC) – subscale of the social competence (SC) scale; addresses behaviors important in responding to the social expectations of adults and showing proper self-restraint and self-management.

Social Competence Scale (SC) – measure of social-behavioral characteristics of children; one of the scales of home and community social behavior scales (HCSBS); consists of two subscales: peer relations (PR) and self-management/compliance (SMC).

Speech Satisfaction Questionnaire (SS) - one item instrument addressing child's overall satisfaction with their speech.

Submucous cleft palate (SMCP) – a cleft palate subgroup resulting from inadequate fusion of muscles of the soft palate and incomplete fusion of palatal (maxillary) shelves during in utero embryonic development.

Velocardiofacial Syndrome (VCFS) – multiple anomaly syndrome caused by microdeletion of chromosome 22 at band q11.2; most common syndrome associated with VPI.

Velopharyngeal Insufficiency (VPI) – speech disorder associated with physiologic dysfunction in the coordinated movement of the velum (soft palate), and posterior and lateral pharyngeal walls; may result from multiple etiologies.

Appendix B

UWO Research Ethics Board Approval Notice

Research Western

Use of Human Participants - Ethics Approval Notice

Principal Investigator: Dr. Philip Doyle
Review Number:18757E
Review Level: Delegated
Approved Local Adult Participants:0
Approved Local Minor Participants:120
Protocol Title: Assessing the Communication Apprehension of Children with Velopharyngeal Insufficiency
Department & Institution: Health Sciences\Communication Sciences & Disorders,University of Western Ontario
Sponsor:
Ethics Approval Date: April 11, 2012 **Expiry Date:**December 31, 2012
Documents Reviewed & Approved & Documents Received for Information:

Document Name	Comments	Version Date
Western University Protocol		
Letter of Information & Consent	VPI group	2012/04/04
Letter of Information & Consent	Control Group	2012/04/04
Advertisement		
Assent		

This is to notify you that The University of Western Ontario Research Ethics Board for Health Sciences Research Involving Human Subjects (HSREB) which is organized and operates according to the Tri-Council Policy Statement: Ethical Conduct of Research Involving Humans and the Health Canada/ICH Good Clinical Practice Practices: Consolidated Guidelines; and the applicable laws and regulations of Ontario has reviewed and granted approval to the above referenced revision(s) or amendment(s) on the approval date noted above. The membership of this REB also complies with the membership requirements for REB's as defined in Division 5 of the Food and Drug Regulations.

The ethics approval for this study shall remain valid until the expiry date noted above assuming timely and acceptable responses to the HSREB's periodic requests for surveillance and monitoring information. If you require an updated approval notice prior to that time you must request it using the University of Western Ontario Updated Approval Request Form.

Members of the HSREB who are named as investigators in research studies, or declare a conflict of interest, do not participate in discussion related to, nor vote on, such studies when they are presented to the HSREB.

The Chair of the HSREB is Dr. . The HSREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000940.

Ethics Officer to Contact for Further Information

This is an official document. Please retain the original in your files.

The University *of* Western Ontario
Office of Research Ethics

Appendix C

LAWSON HEALTH RESEARCH INSTITUTE

FINAL APPROVAL NOTICE

RESEARCH OFFICE REVIEW NO.: R-12-081

PROJECT TITLE: Assessing the Communication Apprehension of Children with Velopharyngeal Insufficiency

PRINCIPAL INVESTIGATOR: Dr. Philip Doyle

DATE OF REVIEW BY CRIC: April 18, 2012

Health Sciences REB#: 18757E

Please be advised that the above project was reviewed by the Clinical Research Impact Committee and the project:

Was Approved

PLEASE INFORM THE APPROPRIATE NURSING UNITS, LABORATORIES, ETC. BEFORE STARTING THIS PROTOCOL. THE RESEARCH OFFICE NUMBER MUST BE USED WHEN COMMUNICATING WITH THESE AREAS.

Dr.

Lawson Health Research Institute

All future correspondence concerning this study should include the Research Office Review Number and should be directed to South Street Hospital.

cc: Administration

Appendix D: Participant Recruitment Advertisement

UWO Social Communication Study

Participants Needed

- **7-14** year old children who:
  - do not have a history of voice or speech disorders
  - are developing typically

- **If you agree to have your child participate, your child will be asked to:**
  - complete a 20-item questionnaire regarding your child's experiences about communicating orally in different social situations
  - provide voice recordings of speech phrases that your child will repeat after a researcher

- Requires 15 minutes of your time

- May be done at your home or at UWO (parking costs will be covered)

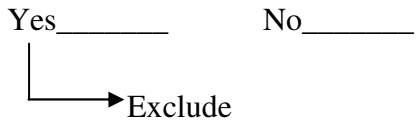
If you are interested in having your child participate please contact: Agnes Dzioba at or e-mail

UWO Research Study	UWO Research Study	UWO Research Study	UWO Research Study	UWO Research Study	UWO Research Study	UWO Research Study	UWO Research Study	UWO Research Study	UWO Research Study
Call or e-mail	Call or e-mail	Call or e-mail	Call or e-mail	Call or e-mail	Call or e-mail	Call or e-mail	Call or e-mail	Call or e-mail	Call or e-mail

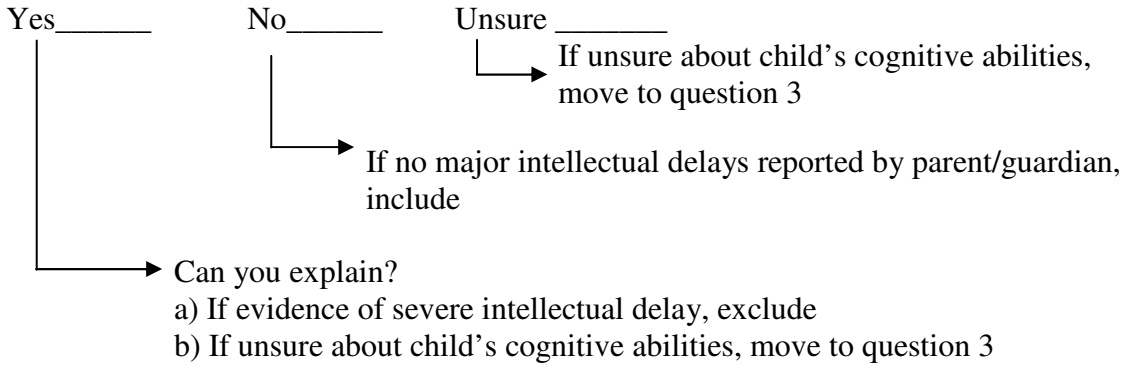
Appendix E

Exclusionary Questions

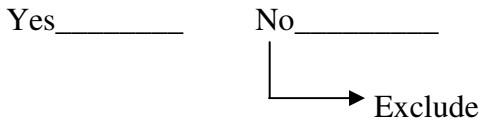
1. Has your child ever been professionally identified as having noticeable nasality? (Ask parents of children identified for control group only)



2. (Question 1 for children in VPI group). Has your child been identified with an intellectual difficulty that's interfering with their school performance?



3. Do you believe that your child is capable of answering a questionnaire addressing their feelings or likes and dislikes? For example, would your child be able to accurately answer questions like: "How do you feel when you have to write a test in school?" or "How do you feel when you play/hang out with your friends?" (very happy/I like it a lot, happy/I like it, no feeling/I don't care, unhappy/I don't like it, very unhappy/I really don't like it)



Appendix F

Letter of Information and Consent for VPI Group

Letter of Information

Assessing the Communication Apprehension of Children with Velopharyngeal Insufficiency

Philip C. Doyle, Ph.D., , Agnieszka Dzioba, M.Sc., Murad Husein, MD, Elizabeth Skarakis-Doyle, Ph.D.Anne Dworschak-Stokan, SLP, Allyson Dykstra, Ph.D.
Investigators

Speech is the means by which we interact with others. When the way in which one speaks calls attention to itself, talking with others can become difficult. Speaking may then become a negative experience for a speaker, and could result in apprehension about speaking. Further it may impact a person's attitudes toward speaking. We are interested in understanding how reluctance to speak may influence one's ability to participate in important daily events.

What is the purpose of this study?

The purpose of this study is to examine speaking apprehension across different social settings in children with velopharyngeal insufficiency. In addition, the relationship between communication apprehension and the attitude that children have towards communicating will be assessed. Finally, the present study will investigate whether there is any relationship between how a child's voice quality is rated and the child's own ratings of communication apprehension.

Who is eligible to participate?

- Children who have been diagnosed with velopharyngeal insufficiency
- English is the primary language of the home *and*
- Are between 7 and 14 years of age

What will be required of You and Your Child?

If you and your child participate in this study:
You will be asked to complete three questionnaires that will take approximately **30** minutes in total.

1. Child Information Form – In this brief survey, you will be asked to provide information such as your child's name, age, gender, current general health status, etc.

2. The Children's Communication Checklist – Second Edition (CCC-2) – In this questionnaire, you will rank the frequency with which your child uses different aspects of language and communication.

3. The Home & Community Social Behavior Scale (HCSBS) – In this inventory, you will be asked to rank your child's social behaviors at home and at school.

Even though the form asks you to "answer all questions" you are not required to do so if you do not want to.

Your child will be asked to participate in four tasks that should also take a total of **30** minutes to complete.

1. The Measure of Elementary Communication Apprehension (MECA) – In this questionnaire, your child will be asked to show how they feel when they communicate orally in different social situations by circling a scale of faces. The questionnaire will be administered as an interview by Agnieszka Dzioba.

2. The Communication Attitude Test -Revised (CAT-R) – In this inventory, Agnieszka Dzioba will read aloud different statements about potential attitudes towards communicating. Your child will indicate whether the statement is true of their own attitudes or not.

3. Voice Recordings – Your child will repeat a series of short phrases and sounds, after which he/she will be asked to talk for one to two minutes about a topic of their choice (e.g. a family vacation, favorite subject in school, etc.). These will be audio recorded and kept for use in future research.

You and your child may ask questions about the activities you participate in at any time. Participation in this study is voluntary. You may choose for your child not to take part in this study. If you decide to let your child take part, you may withdraw your child from the study at any time. In addition, you or your child may decline to answer any questions. In any of these cases, your decision will not affect your child's current or future care.

There are no known risks involved in this study. Benefits of the study include gaining a more complete understanding of the overall functioning of children with VPI. Assessing the communication apprehension of these children will provide valuable information about the potential impacts of living with VPI on feelings of concern when communicating in social settings. At your written request, results from the CCC-2 questionnaire may be shared with your child's Speech Language Pathologist.

Where will the study take place?

This study will take place in a quiet therapy room at Victoria Hospital. In the event that your child cannot participate on the date of his/her appointment, the study will take place on an alternate date at the H.A. Leeper Speech and Hearing Clinic located in Elborn College, University of Western Ontario. If the latter is the case parking will be provided.

What will be done with the information obtained?

The investigators involved in this study will keep your child's identity and study information confidential. Your child will not be personally identified in any capacity as a result of participation in this study. All identifiable information will be stored in a locked cabinet at the Voice Production and Perception Lab, Elborn College. Only study investigators will have access to the data. All identifiers will be removed from the data prior to storing information on a password protected computer. A copy of this Letter of Information will be given to you to keep.

What if I have questions that haven't been answered here?

If you have any questions about this study please contact: Agnieszka Dzioba, Doctoral Candidate, Western University, at [redacted] or email [redacted]. You may also contact: Dr. Philip C. Doyle, Professor, Western University, [redacted]; Dr. Skarakis-Doyle, Professor, Western University, [redacted]; Dr. Murad Husein, Pediatric Otolaryngologist, Victoria Hospital, [redacted]; Anne Dworschak-Stokan, Speech Language Pathologist, Thames Valley Children's Centre, [redacted]; Dr. Allyson Dykstra, Assistant Professor, Western University , [redacted].

If you have any questions about the conduct of this study or your rights as a research subject you may contact Dr. [redacted], Scientific Director, Lawson Health Research Institute at [redacted].

Philip C. Doyle, Ph.D.
Professor
School of Communication Disorders, University of Western Ontario

Agnieszka Dzioba, M.Sc.
Doctoral Candidate
Health and Rehabilitation Science Program, University of Western Ontario

Assessing the Communication Apprehension of Children with Velopharyngeal Insufficiency
Principal Investigator: Dr. Philip C. Doyle

CONSENT FORM

I have read the Letter of Information, have had the nature of the study explained to me and I agree to participate. All questions have been answered to my satisfaction.

_____
Name of Child (Please Print)

_____	_____	_____
Name of Parent (Please Print)	Signature of Parent	Date

_____	_____	_____
Name of Person Obtaining Consent	Signature of Person Obtaining Consent	Date

Appendix G

Letter of Information and Consent for Control Group

Letter of Information

Assessing the Communication Apprehension of Children with Velopharyngeal Insufficiency

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Investigators

Speech is the means by which we interact with others. When the way in which one speaks calls attention to itself, talking with others can become difficult. Speaking may then become a negative experience for a speaker, and could result in apprehension about speaking. Further it may impact a person's attitudes toward speaking. We are interested in understanding how reluctance to speak may influence one's ability to participate in important daily events.

What is the purpose of this study?

To examine speaking apprehension across different social settings in typically developing children compared to children with a speech disorder known as velopharyngeal insufficiency (VPI). In addition, the relationship between communication apprehension and the attitudes that children have towards communicating will be assessed. Finally, the present study will investigate whether there is any relationship between how a child's voice quality is rated and the child's own ratings of communication apprehension.

Who is eligible to participate?

- Children who are between 7 and 14 years of age
- English is the primary language of the home, *and*
- Are typical in their speech, language, academic and social development

What will be required of You and Your Child?

If you and your child participate in this study:

You will be asked to complete two questionnaires that will take approximately **15** minutes in total.

1. Child Information Form – In this brief survey, you will be asked to provide information such as your child's name, age, gender, current general health status, etc.

2. The Home & Community Social Behavior Scale (HCSBS) – In this inventory, you will be asked to rank your child's social behaviors at home and at school.

Even though the form asks you to "answer all questions" you are not required to do so if you do not want to.

Your child will be asked to participate in three tasks that will take approximately **30** minutes in total.

1. The Measure of Elementary Communication Apprehension (MECA) – In this questionnaire, your child will be asked to show how they feel when they communicate orally in different social situations by circling a scale of faces. The questionnaire will be administered as an interview by Agnieszka Dzioba.

2. The Communication Attitude Test -Revised (CAT-R) – In this inventory, Agnieszka Dzioba will read aloud different statements about potential attitudes towards communicating. Your child will indicate whether the statement is true of their own attitudes or not.

3. Voice Recordings – Your child will repeat a series of short phrases and sounds, after which he/she will be asked to talk for one to two minutes about a topic of their choice (e.g. a family vacation, favorite subject in school, etc.). These will be audio recorded and kept for use in future research.

You and your child may ask questions about the activities you participate in at any time. Participation in this study is voluntary. You may choose for your child not to take part in this study. If you decide to let your child take part, you may withdraw your child from the study at any time. In addition, you or your child may decline to answer any questions.

There are no known risks involved in this study. Benefits of the study include gaining a more complete understanding of the overall functioning of children with VPI. Assessing the communication apprehension of these children compared to those without the problem will provide valuable information about the potential impacts of living with VPI on feelings of concern when communicating in various social settings.

Where will the study take place?

The study will take place at the H.A. Leeper Speech and Hearing Clinic located in Elborn College, Western University or in your home, it is your choice. Should you come to the H.A. Leeper Speech and Hearing Clinic at Elborn College, parking will be provided.

What will be done with the information obtained?

The investigators involved in this study will keep your child's identity and study information confidential. Your child will not be personally identified in any capacity as a result of participation in this study. All identifiable information will be stored in a locked cabinet at the Voice Production and Perception Lab, Elborn College. Only study investigators will have access to the data. All identifiers will be removed from the data prior to storing information on a password protected computer. A copy of this Letter of Information will be given to you to keep.

What if I have questions that haven't been answered here?

If you have any questions about this study please contact: Agnieszka Dzioba, Doctoral Candidate, Western University, at or email . You may also contact: Dr. Philip C. Doyle, Professor, Western University, ; Dr. Skarakis-Doyle, Professor, Western University, ; Dr. Murad Husein, Pediatric Otolaryngologist, Victoria Hospital, ; Anne Dworschak-Stokan, Speech Language Pathologist, Thames Valley Children's Centre, ; Dr. Allyson Dykstra, Assistant Professor, Western University, .

If you have any questions about the conduct of this study or your rights as a research subject you may contact Dr. , Scientific Director, Lawson Health Research Institute at .

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Assessing the Communication Apprehension of Children with Velopharyngeal Insufficiency
Principal Investigator: Dr. Philip C. Doyle

CONSENT FORM

I have read the Letter of Information, have had the nature of the study explained to me and I agree to participate. All questions have been answered to my satisfaction.

_____
Name of Child (Please Print)

_____	_____	_____
Name of Parent (Please Print)	Signature of Parent	Date

_____	_____	_____
Name of Person Obtaining Consent	Signature of Person Obtaining Consent	Date

Appendix H

CHILD ASSENT FORM

Assessing the Communication Apprehension of Children with Velopharyngeal Insufficiency

Philip C. Doyle, Elizabeth Skarakis-Doyle, Agnieszka Dzioba, Murad Husein, Anne Dworschak-Stokan, Allyson Dykstra

Why you are here?

A student from the university named Agnieszka wants to tell you about a study about children with speech problems. She wants to see if you would like to be in this study. Dr. Husein, Dr. Doyle, Dr. Skarakis-Doyle, Anne Dworschak-Stokan, Agnieszka Dzioba, and Dr. Dykstra are doing this study.

Why are they doing this study?

They want to see how you feel when you talk to different people such as your friends or in front of the class. They also want to see if the way you talk makes a difference on how you feel when you talk to other people.

What will happen to you?

If you agree to be in the study:

1. You will answer two questionnaires about your feelings about talking to other people.
2. You will be asked to say speech phrases and different sounds into a microphone and your voice will be recorded on a computer.

Will the study harm you?

The things that you will be asked to do will not hurt you in any way.

Will the study help you get better?

This study won't make you better. But the doctors might find out something that will help other children with speech problems later.

What if you have any questions?

You can ask questions any time, now or later. You can talk to Agnieszka, the doctors, your family, or someone else.

Do you have to be in the study?

You do not have to be in the study. No one will be mad at you if you don't want to do this. If you don't want to be in the study, just say so. Even if you say yes now you can change your mind later. It's up to you.

I want to participate in this study.

_____

Print name of child

_____	_____	_____
Signature of Child	Age	Date
_____		_____
Signature of Person Obtaining Assent		Date

Appendix I

Participant Code: _____

Child Information Form for VPI Group
(To be completed by parents of children in the VPI group)

Please provide the following information regarding your child:

Male Female (please circle) Date of Birth:_____

Grade in School: _____

Please circle **Yes** or **No** to the following questions:

1. Has your child ever had any hearing problems? No Yes

If yes: a) Does the child have a history of permanent or reversible hearing loss? No Yes

b) Has your child had surgery on their ear(s)? No Yes

2. To your knowledge, is your child's hearing within normal limits at this time? No Yes

3. Is your child currently experiencing any cold or flu-like symptoms, or do they have nasal congestion? No Yes

4. Has your child been identified with a learning disability? No Yes

If yes, in what subject area(s) is your child experiencing difficulties?
Math____ Reading____ Spelling____ Writing_____

What kind of educational assistance is your child provided with at school?

Resource teacher_____ Teaching assistant_____ After school tutor_____

Other (please specify)_____

5. Is English the primary language spoken in your home? No Yes

6. Besides English, are there other languages spoken in your home? No Yes…..if yes, please specify_____

Does your child speak (Y/N) or understand (Y/N) this language?

7. Is your child's speech understandable most of the time to most people? No Yes

Appendix J

Participant Code: _____

Child Information Form for Control Group

(To be completed by parents of children in the control group)

Please provide the following information regarding your child.

Male Female (please circle) Date of Birth:_____

Grade in School: ____

Please circle **Yes** or **No** to the following questions:

1. Does your child have an identified voice or speech disorder? No Yes

2. Has your child ever had any hearing problems? No Yes

If yes: a) Does your child have a history of permanent or reversible hearing loss? No Yes

b) Has your child had surgery on their ear(s)? No Yes

c) Does he/she currently have tubes placed in their ear(s)? No Yes

d) Has he/she had tubes placed in their ear(s) in the past? No Yes

3. To your knowledge, is your child's hearing within normal limits at this time? No Yes

4. Is your child currently experiencing any cold or flu-like symptoms, or do they have nasal congestion? No Yes

5. Has your child been identified with a learning disability? No Yes

If yes, in what subject area(s) is your child experiencing difficulties?
Math____ Reading____ Spelling____ Writing_____

What kind of educational assistance is your child provided with at school?

Resource teacher_____ Teaching assistant_____ After school tutor_____
Other (please specify)_____

6. Is English the primary language spoken in your home? No Yes

7. Besides English, are there other languages spoken in your home? No Yes…..if yes, please specify_____

Does your child speak (Y/N) or understand (Y/N) this language?

Appendix K

American Cleft-Palate Association Clinical Data Base Committee Speech Pathology Data Entry Form (Revised)

Participant Code: Patient Age: Date: Clinician:

1. Hypernasality 1= normal 2= mild 3= mild-moderate 4= moderate 5= moderate-severe 6= severe	**4. Velopharyngeal Function** 1= adequate 2= marginal 3= inadequate	**7. Compensatory Articulation** 1= none observed 2= glottal stop 3= pharyngeal fricative 4= pharyngeal stop 5= mid-dorsal palatal stop 6= posterior nasal fricative
2. Hyponasality 1= normal 2= mild 3= mild-moderate 4= moderate 5= moderate-severe 6= severe	**5. Articulation Proficiency** 1= normal 2= mild 3= mild-moderate 4= moderate 5= moderate-severe 6= severe	**8. Voice Quality** 1= normal 2= mild abnormality 3= mild-moderate abnormality 4= moderate abnormality 5= moderate-severe abnormality 6= severe voice abnormality
3. Audible Nasal Emission 1= normal 2= mild 3= mild-moderate 4= moderate 5= moderate-severe 6= severe	**6. Overall Intelligibility** 1= normal 2= mild 3= mild-moderate 4= moderate 5= moderate-severe 6= severe	

Note any additional observations in the space below:

Appendix L

SPEECH PHRASES FOR VELOPHARYNGEAL ASSESSMENT

1) “Patty ate apple pie”

2) “Sissy sees the sky”

3) “Go get a cookie for Kate”

4) “She likes high boots”

5) “puppy, puppy”

6) “Jerry’s slippers were blue”

7) “Stop the bus”

8) “My mama makes lemon jam”

9) “Mommy, mommy, mommy”

Reproduced from: Conley, S.F., Gosain, A.K., Marks, S.M., & Larson, D.L. (1997). Identification and assessment of velopharyngeal inadequacy. *American Journal of Otolaryngology, 18*(1), 38-46.

Appendix M

Participant Code: _____

VPI Group Brief Participant Health History
(Completed by Researcher's Chart Review)

1. What is the underlying structural cause of the child's velopharyngeal insufficiency? (circle all that apply)

a) Isolated cleft in soft palate only
b) Isolated cleft in hard and soft palate
c) Unilateral cleft lip and palate
d) Bilateral cleft lip and palate
e) Submucous cleft palate
f) Adenoidectomy
g) Other (please specify)_____
h) Unknown

2. Has the child been diagnosed with a syndrome [e.g., Velocardiofacial syndrome/22q11.2 deletion syndrome, Stickler syndrome, Treacher Collins syndrome, etc.]? No Yes…..if yes, please specify_____

3. Has the child been diagnosed with any other voice or speech disorder in addition to hypernasality?

No Yes……if yes, please specify: _____

4. Has the child received any of the following treatments for velopharyngeal insufficiency?

a) speech therapy: No Yes
If yes, for what areas: articulation____, resonance____, language____, voice____
b) surgery: No Yes
If yes: a) type of surgery_____
b) time since last surgery (in months) _____
c) other (please specify) _____

5. Does the child have a history of middle ear infections? No Yes
If yes: a) Does he/she currently have tubes placed in their ear(s)? No Yes
b) Has he/she had tubes placed in their ear(s) in the past? No Yes

Appendix N

Frequency Distribution of Perceptual Assessment (ACPA) Scores of Speech Characteristics of Children in the VPI Group (n=20)

Speech Characteristics Score	Rating Scale[a] (1-6) 1	2	3	4	5	6	Median
Hypernasality (n)	0	5	4	7	1	3	4.00
Hyponasality (n)	16	3	1	0	0	0	1.00
Audible Nasal Emission (n)	0	3	4	8	2	3	4.00
Overall Intelligibility (n)	0	8	7	2	3	0	3.00
Articulation Proficiency (n)	0	2	7	7	2	2	3.00
Voice Quality (n)	17	2	1	0	0	0	1.00

Note. Abbreviations: ACPA = American Cleft-Palate Association Clinical Data Base Committee Speech Pathology Data Entry Form (Revised); VPI = velopharyngeal insufficiency; [a] Rating scale of severity of speech characteristic is a 6 point ordinal scale: 1 = normal; 2 = mild; 3 = mild-moderate; 4 = moderate; 5 = moderate-severe; 6 = severe.

Curriculum Vitae

Name:	Agnieszka Dzioba
Post-secondary Education and Degrees:	The University of Western Ontario London, Ontario, Canada 2002-2006 BHSc.(Hons) The University of Western Ontario London, Ontario, Canada 2006-2008 M.Sc. The University of Western Ontario London, Ontario, Canada 2008-2014 Ph.D. (Candidate)
Honours and Awards:	Dean's Entrance Scholarship 2008-2009 Ontario Graduate Scholarship in Science and Technology 2010-2011 Ontario Graduate Scholarship 2011-2012, 2012-2013
Related Work Experience	Teaching Assistant The University of Western Ontario 2006-2008, 2010 Research Assistant The University of Western Ontario 2007 Editorial Consultant Quality of Life Research Journal 2010 Editorial Consultant Cleft Palate Craniofacial Journal 2010-2014

Publications:

Brandt, M.G., Rotenberg, B.W., Moore, C.C., Bornbaum, C.C., **Dzioba, A.**, Glicksman, J.T., & Doyle, P.C. (2014). Impact of nasal surgery on speech resonance. *Annals of Otology, Rhinology, and Laryngology, 123*(8), 564-570.

Dzioba, A., Skarakis-Doyle, E., Doyle, P. C., Campbell, W., & Dykstra, A. D. (2013). A comprehensive description of functioning and disability in children with velopharyngeal insufficiency. *Journal of Communication Disorders, 46*(4), 388-400.

Dzioba, A., Husein, M., Dworschak-Stokan, A., & Doyle, P.C. Evaluation of Communication Apprehension in Adolescents with Velopharyngeal Insufficiency. C*left Palate-Craniofacial Journal*, *49*(3), 17-24.

Yeung, J.C., Fung, K., Bornbaum, C.C., Day, A.M.B., **Dzioba, A.**, Parsa, V., Levee, T., Doyle, P.C. (2011). Clinical Approach to Monitoring Variability Associated with Adductor Spasmotic Dysphonia (ADSD). *Journal of Otolaryngology Head and Neck Surgery*, *40*(4), 343-349.

Bechard, D., Day, A.M.B., Dufour, S., **Dzioba, A.**, McCabe, C., & Rasmussen, S. (2010). How Medical Students Conceptualize Disability: Implication for Interprofessional Practice and Education, *Journal of Research in Interprofessional Practice and Education, 1*(2), 159-178.