COMPARING SPEAKER-BASED AND OBSERVER-BASED MEASURES OF THE PERCEPTION OF PHYSICAL TENSION DURING STUTTERING

by

Seth Edward Tichenor

A.B. Classics, Wabash College, 2010

Submitted to the Graduate Faculty of

The University of Pittsburgh in partial fulfillment

of the requirements for the degree of

Master's of Science

University of Pittsburgh

2013

UNIVERSITY OF PITTSBURGH

School of Health and Rehabilitation Sciences

This thesis was presented

by

Seth Edward Tichenor

It was defended on

June 28, 2013

and approved by

J. Scott Yaruss PhD, Associate Professor, Communication Science and Disorders

Paula Leslie PhD, Associate Professor, Communication Science and Disorders

Susan Shaiman PhD, Associate Professor, Communication Science and Disorders

Thesis Director: J. Scott Yaruss PhD, Associate Professor, Communication Science and Disorders

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Seth Edward Tichenor, M.S.

University of Pittsburgh, 2013

People who stutter commonly experience increased levels of physical tension during moments of stuttering. These increased levels of physical tension have been shown to vary in location of the body and from individual to individual (Brutten & Shoemaker, 1967; Wingate, 1964). Though treatment of increased physical tension often involves speaker self-evaluation (see Van Riper, 1973), a widely-used assessment of physical tension relies on a clinician's observations (SSI-4; Riley, 2009). This study proposed to answer the question, "how do clinicians' perceptions of physical tension compare to the speaker's perceptions of physical tension?" Ten adults who stutter recruited from the Pittsburgh chapter of the National Stuttering Association (NSA), were audio-video recorded in select speaking samples. Two expert speech and language pathologists who are also board recognized specialists in fluency disorders (BRS-FD) evaluated selected samples from each participant who stutters using the SSI-4 and a Perception of Physical Tension Form developed for this study. Participants who stutter evaluated themselves using the same forms and discussed their experience of physical tension during an interview so key themes related to physical tension could be identified and compared to results from the clinicians' observations and test results.

Results revealed that physical tension occurring in certain locations, such as the abdomen, chest, throat, cheeks, and tongue, may not be perceived by clinicians. Thematic analysis revealed that the speakers' experience of physical tension is highly variable and changes

over time, possibly relating to other themes of acceptance and self-perception. These results warrant further research, perhaps even the development of a more specific method of perceiving physical tension using self-reports of speakers. Such assessment may lead to better diagnostic and therapeutic outcomes.

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PREFACE

I would like to thank Dr. J. Scott Yaruss for the countless edits of this paper. His guidance, along with the guidance of Dr. Paula Leslie and Dr. Susan Shaiman, added to the quality of this paper while improving my skills of scientific writing and academic research.

1.0 INTRODUCTION

Physical tension during moments of stuttering is typically viewed as a learned behavior that may develop in people of all ages, even children (Wingate, 1964). Observed physical tension has been shown to vary from person to person (Brutten & Shoemaker, 1967; Snidecor, 1955; Wingate, 1964). Such tension can occur in muscles of the respiratory, phonatory, or articulatory systems (Snidecor, 1955; Starkweather, 1987). Increasing physical tension may result from a desire to maintain fluency or to stop a moment of stuttering once it has begun (Starkweather, 1987). Physical tension may be increased when a person reacts to external factors, such as listener reactions and time pressures (Bloodstein, 1950, 2008; Johnson, 1961; Starkweather, 1987; Starkweather & Givens-Ackerman, 1997). It may also be increased in response to internal factors, such as the anticipation and learned avoidance of stuttering (Johnson, 1967; Sheehan, 1954; Starkweather, 1987). Regardless of the cause, increased physical tension is clinically significant because it directly correlates to perceived severity of stuttering by observers and conversation partners (Martin & Haroldson, 1992; Riley, 1972).

The traditional measures involved in stuttering severity judgments are percent of syllables stuttered, average duration of disfluencies, and the perception of the presence and degree of physical tension. While much research has focused on the reliability concerns of observing some types of stuttering behaviors, (e.g. Cordes & Ingham, 1994; Cordes, Ingham, Frank, & Ingham, 1992; Curlee, 1981; Hall, Segers, & Conti, 1987; Kully & Boberg, 1988), little

research has been done to address the concern of whether or not these observations are *valid*. Reliable observations may still be invalid because they lack truthfulness (Schiavetti, Metz, & Orlikoff, 2011). Instrumentation is one method of establishing truthfulness in measurements of physical tension during stuttering. Research has shown that EMG levels of muscle activity in certain muscles and muscle groups do not significantly differ from EMG measurements of people who do not stutter (see de Felicio, Freitas, Vitti, & Regalo, 2007; Smith, Denny, Shaffer, Kelly, & Hirano, 1996). This highlights a possible disparity between what instrumentation records, what speakers experience, and observers perceive. A second possible measure of validity may be the self-reports of people who stutter. If a speaker and observer report they perceive physical tension, it is safe to say that *something* clinically significant is occurring even if instrumentation cannot yet fully quantify the event. For the purposes of this study, both clinician and speaker perceptions of physical tension during moments of stuttering will be considered equally valid because both groups perceive tension and judge it to be negatively affecting speech. However, no research exists comparing speaker self-reports of their experience of physical tension to clinician perceptions of the same moments. More research is needed to determine the degree to which these compare.

The construction of one commonly used assessment, the Stuttering Severity Instrument 4th edition (SSI-4: Riley, 2009), leaves several unanswered questions about how clinicians might perceptually evaluate physical tension. The SSI calculates stuttering severity by evaluating the components of percent stuttered syllables, duration, and amount of physical tension. Although training on how to calculate frequency scores and duration scores are provided in the SSI-4 manual, no training is provided on how to rate the locations or degrees of physical tension for the physical concomitant scores (Riley, 2009, p. 6). This lack of training is compounded by the

possibilities that (a) some less perceivable locations of physical tension may not be encompassed by the SSI-4 (see Snidecor, 1955), (b) degrees of tension may be hard for observers to differentiate (Hall et al., 1987; Lewis, 1995), and (c) underlying tension may exist in the absence of observable movement. The result is that the validity of the SSI-4 itself may be called into question.

Self-reported measures of stuttering severity have a long history in stuttering research, diagnostics, and therapy. Many published assessments and treatment approaches use self-reports to measure non-visible aspects of the stuttering disorder, e.g. shame, fear, helplessness, and loss of control (Ingham, Ingham, & Bothe, 2012; see review in Manning, 2010; Yaruss & Quesal, 2006). Self-reported measures may offer solutions to some of the problems of observer-based methods of measuring stuttering behaviors, such as the perception of physical tension. Speaker-based reports of the perceived location of degree of physical tension may provide insights that are not presently available through observer-based measures. Self-reports may also be more valid in that they directly relate to the speaker's experience during the moment of stuttering, without bias or interpretation introduced by the listener. Nevertheless, traditional methods of measuring physical tension are dependent on observer judgment and the assumption that all physical tension that is clinically relevant must be visible to the observer. Both of these assumptions may introduce bias and lead to adverse clinical intervention. Self-reported measures may be a solution to both of these potential problems in that the clinician biases and interpretations are replaced with client-experienced events. Unfortunately, at present, little information exists about the relationship between self-reported measures and clinician-based observations of physical tension. Therefore, the primary purposes of this study are to explore the possibility of using self-reported measures for describing the location and degree of perceived

physical tension during moments of stuttering and to compare these self-reports with more traditional clinician-based observations.

1.1 PHYSICAL TENSION IN STUTTERING

Physical tension has been shown to vary in location of the body from person to person (Brutten & Shoemaker, 1967; Wingate, 1964). Though physical tension may appear in any muscles of the respiratory, phonatory, or articulatory systems (Snidecor, 1955; Starkweather, 1987), increased physical tension may also occur in muscles that are not involved with producing the target sound that the speaker is trying to produce (Bloodstein, 1975). Physical tension may be increased to temporarily maintain fluency or to stop stuttering once it has occurred. Increasing physical tension may also be learned as a reaction to internal factors such as fear, anticipation, and avoidance that have been learned from past experiences (Johnson, 1967; Sheehan, 1954; Starkweather, 1987). Physical tension may also be learned in a response to external factors such as time pressures and negative listener reactions (Bloodstein, 1950, 2008; Johnson, 1961; Starkweather, 1987; Starkweather & Givens-Ackerman, 1997). This "snowball" effect of physical tension builds upon itself. Starkweather said " …their struggle to inhibit the repetitiveness, to stop its onward rush, to hide it from others, to avoid its occurring in the first place, are all efforts that would be likely to introduce muscle tension into the speech mechanism" (p. 151). Because a speaker stuttered in previous situations, had one or more negative reactions, he or she is more likely to increase tension in an effort to avoid repeating the negative experience in the future. As Johnson (1967) said, "Stuttering is what the speaker does when he 1) expects to stutter, 2) dreads doing it, and 3) reacts negatively—*usually by tensing*—… in an effort to avoid

doing it" (p. 249, emphasis added). Physical tension that is visible may be observed by the listener, and, as a result, the stuttering behavior may be rated as more severe (Martin & Haroldson, 1992; Riley, 1972).

1.1.1 Locations and degrees of physical tension

Physical tension during moments of stuttering may occur in muscles of the respiratory, phonatory, and articulatory systems (Snidecor, 1955; Starkweather, 1987). Snidecor (1955) evaluated 17 stutterers (one female and sixteen male) by using self-reports. Each participant was photographed during moments of stuttering and then looked at these photographs during self-reports. Snidecor evaluated 144 moments of stuttering. Two interviews were conducted with each participant—one immediately after the initial set of photographs and the second between one and three weeks later. In each interview the participant was asked for 1) the location of physical tension, 2) the degree of tension using the terms "noticeable, barely tense, quite tense, or very tense;" and 3) the subject's "expression of the degree of his desire to stutter or not to stutter" (Snidecor, 1955, p. 378). Thus, the 72 original moments of stuttering were reported twice to give a total of 144 self-reports. The self-reported locations of tension are reproduced in Table 1. The self-reported degrees of physical tension are reproduced in Table 2. Degree and location of tension were reported for every one of the 144 self-reports.

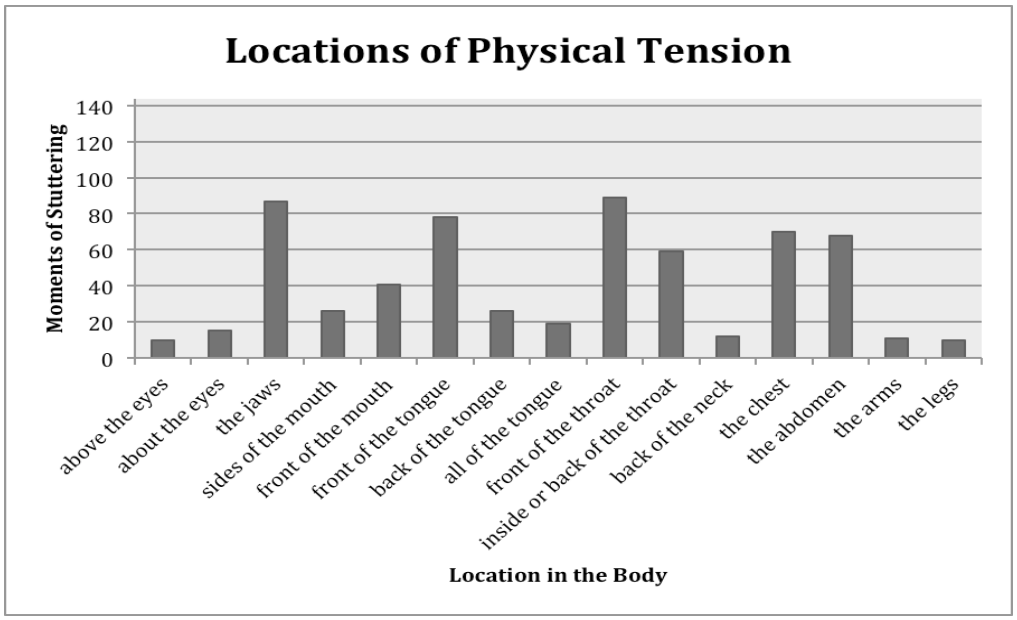

Figure 1. Locations of Physical Tension, adapted from data in Snidecor (1955).

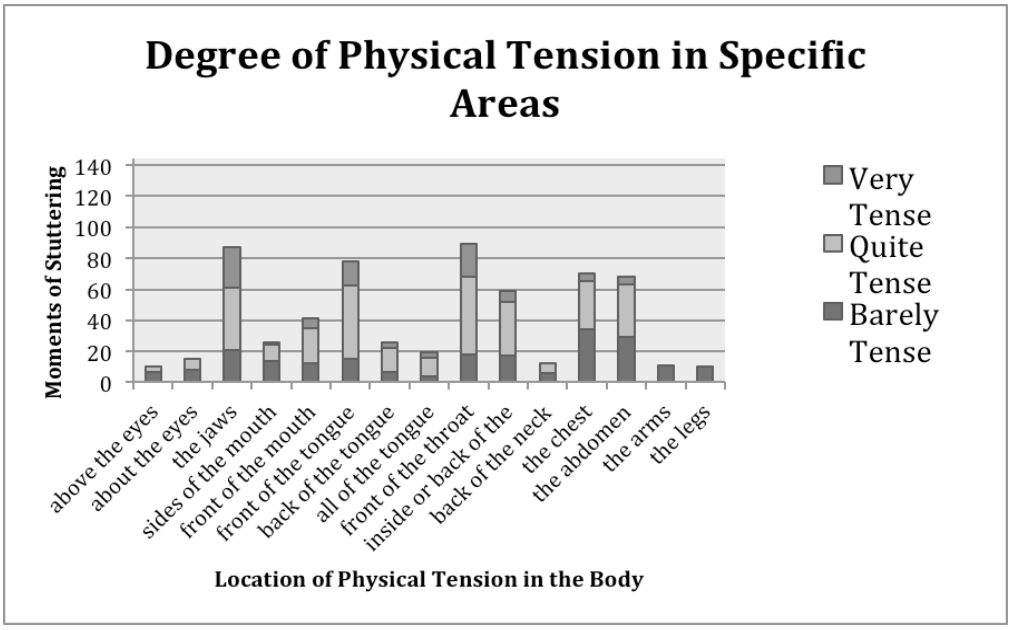

Figure 2. Degrees of Physical Tension, adapted from data in Snidecor (1955)

The most frequently reported areas of the body where tension was present were the jaws, front of the tongue, front of the throat, inside or back of the throat, the chest, and the abdomen. Snidecor concluded that no one area was reported by all participants. Snidecor (1955) showed that 89% of the total reports of physical tension reported from the original interview were

reported in the follow-up interview. This indicates that overall the self-reports were reliable in the sense that the person who stutters could recognize or remember the moment of stuttering from the previous session. While one study alone is not itself enough to suggest that people who stutter are reliable in reporting location and degress of physical tension, it does suggest that it is possible.

The degrees of percieved tension from Snidecor (1955) are noteworthy to compare published studies which use instrumentation to evaluate muscle activity during moments of stuttering. Shapriro (1980) stated that while no particular relationship exists between disfluency and degree of tension, all moments of stuttering are accompanied by increased and variable muscle tension. In contrast, Smith, Denny, Shaffer, Kelly, & Hirano (1996) illustrated how moments of stuttering are not typically characterized by increased levels of tension in laryngeal muscles when evaluated through electroymyography (EMG). These levels do not significantly differ from the EMG levels found in adults who do not stutter (Smith et al., 1996). The same results have been found with muscle activity of the lower and upper lips (de Felicio et al., 2007). Though EMG amplitude may be the same for moments of stuttering and moments of fluent speech, oscillations of muscle activity in some muscles may differ between moments of stuttering and moments of fluent speech, suggesting variability between the speech patterns of adults who stutter (Denny & Smith, 1992). These patterns may be true of laryngeal muscles (Smith et al., 1993), as well as more visible muscle systems (Denny & Smith, 1992). These oscilations may not be as significant in younger children, as both children who do and do not stutter show evidence of these patterns, and may be developmental in origin (Kelly, Smith, & Goffman, 1995).

This highlights a possible discrepency between what a speaker experiences during moments of stuttering and what instrumentation is able to record. A speaker may perceive great amounts of phsyical tension, such as in locations and degrees reported by Snidecor (1955), when instrumentation records none. Or speech may be perceptually fluent to the observer while speech musculature contains high activation levels (Craig & Cleary, 1982). One possible solution to this disparity may be found in the more accurate measurement of cocontracting muscles (Smith, 1990), though more research is needed.

There exists a similar discrepency with commonly used perceptual measurements. The SSI-4 places location of physical tension into one of four categores—distracting sounds, facial grimaces, head movements, and movements of the extremeties (Riley, 2009). These four categories consider tension in terms of movement and amount of distraction to the listener (see section 1.2.2 for detailed discussion on the SSI-4). It is possible that tension that occurs for the speaker in asbence of observable movement may go unobserved. Some locations of physical tension may be more easily observed during movment more than others. Snidecor (1955) showed that the most tense-looking areas of the body are the jaws, tongue, throat, chest, and abdomen. Areas such as the jaws and tongue may be more observable during movement than areas such as the throat, chest, and abdomen. These areas may not fall under the four categories of the SSI-4 yet they are meaningful areas of tension commonly experienced by speakers (Snidecor, 1955). Speaker reports during moments of stuttering, with respect to location and degree of physical tension, do not agree with what is recorded via instrumentation and clinician observation. Further follow-up of this disparity, such as that conducted in this study, is therefore warranted.

1.1.2 Duration of Physical Tension in Speech Muscles

Elevated levels of activity in lip muscles have been shown to persist long after the stutter ended (Starkweather & Givens-Ackerman, 1997; Van Lieshout, Peters, Starkweather, & Hulstijn, 1993). Van Lieshout et al (1993) evaluated one group of people who stuttered and one group of people who did not stutter while speaking a word that required the [o] phone. The individuals who stuttered showed higher EMG levels than did the individuals who did not stutter. The individuals who stuttered also showed longer EMG durations than did the indivudals who did not stutter. In other words, the physical tension decreased to baseline faster for the individuals who did not stutter. Starkweather & Givens-Ackerman (1997) stated that it is unlikely this theme of persisting tension only applies to lip muscles and may be true for other muscles of the speech system. It is possible that, perceivable to the listener or not, the effects of tension in the speech mechanism may persist after the moment of stuttering has passed. This increased tension may perceptually affect speech even though the individual moment of stuttering may have passed. Duration of physical tension may also directly affect percieved stuttering severity. Shapiro (1980) stated that as the duration of physical tension increases, so does the proability that observers will perceptually rate the stuttering as more severe.

1.1.3 Treatment of physical tension in stuttering

Increased physical tension is also one of the first things people who stutter talk about when asked what stuttering feels like (Bloodstein, 1975). In Starkweather's (1987) definition of fluency, he addresses speech effort, "ease of speaking is a dimension, perhaps the most central dimension, of fluency" (p. 21). Reducing the overall effort of speaking is a goal of many stuttering

treatments—including fluency shaping and stuttering modification (Cordes & Ingham, 1997). Still, it can be difficult to treat increased physical tension in therapy because the speaking pattern is often deeply ingrained into the speaker (Van Riper, 1973). The speaker has grown to rely on increased levels of tension and feels that they cannot speak without them. Motor-learning theory may also add to this problem. Though difficult to treat, it can be rewarding when a person who stutters overcomes their struggle with physical tension. For example, Van Riper (1973) shared the experience of someone who had overcome increased physical tension during stuttering, "Look at me. Look there how I'm squeezing my spout…And now, I'm saying it, the same word, without any [tension]… That's nuts. I'm going to quit that crazy stuff if I can!" (p. 261).

Training a person to relax speech muscles with clinician feedback is often used to reduce tension during moments of stuttering (Brutten & Shoemaker, 1967; Gilman & Yaruss, 2000; Van Riper, 1973). EMG biofeedback has also been effectively used to reduce tension during moments of stuttering in certain muscle groups, such as in facial and laryngeal systems (Craig & Cleary, 1982; St Louis, Clausell, Thompson, & Rife, 1982). Instrumentation has the benefit of reducing the risk of clinician biases and errors, but it is not without possible pitfalls (see section 1.1.1 in Review). People who stutter may have tension that is not perceptible to instrumentation (Guntupalli, Kalinowski, & Saltuklaroglu, 2006), the equipment necessary may not be available in most clinics, and tension may exist in areas of the body that instrumentation cannot accurately record. Though reducing physical tension may be accomplished via self-evaluation, exploration, or voluntary relaxation, observer-based methods are most often used for the initial assessment of physical tension during moments of stuttering.

1.2 OBSERVER-BASED MEASURES OF STUTTERING BEHAVIORS

Traditional measures of stuttering behaviors, such as percent of syllables stuttered, average duration of disfluencies, and presence and degree of physical tension, have typically been evaluated via observer-based methods, though scientific instrumentation has occasionally been used in research settings (Smith et al., 1996). Observer-based measurements of frequency and types of disfluencies are clinically useful because they allow for real-time analysis, planning treatment, and tracking improvement across time (e.g., Yaruss, 1998). Still, observer-based methods have concerns. As Cordes & Ingham (1994) pointed out in their analysis of event-by-event judgments of stuttering, many studies are based on "requiring untrained observers to record stuttering events according to their own idiosyncratic perceptual definitions" (p. 287).

Over the years, researchers have questioned the reliability of observer-based methods during moments of stuttering. Many studies have shown large differences in clinicians' judgments of stuttering frequency in identical samples (Cordes, 1994; Cordes & Ingham, 1994; Kully & Boberg, 1988). Specific event-by-event judgments of whether stuttering has occurred show similar poor levels of agreement between observers (Curlee, 1981; MacDonald & Martin, 1973; Martin, Haroldson, & Woessner, 1988; Young, 1975). Differences in judgment also exist even with more experienced observers (Cordes et al., 1992; Ham, 1989; Kully & Boberg, 1988).

Many solutions to this reliability problem have been suggested. Most of these are directed at improving clinician's observation skills. For example, Cordes & Ingham (1994) and Yaruss (1998) provided guidelines for training observers to achieve a higher degree of reliability. Moreover, Cordes & Ingham (1994) proposed the establishment of a specifically defined and

standardized set of behaviors that should be evaluated by all clinicians, and showed that training observers with feedback and guidance improves reliability scores (Ingham & Cordes, 1997). More recent studies have used "experts." These are clinicians who see clients who stutter clinically, have a certain number of years experience working with stuttering, or specialize in the treatment of stuttering. Such studies have shown higher degrees of reliability (see Alpermann, Huber, Natke, & Willmes, 2010). Such studies also have shown mixed reliability, with expert judges agreement on stuttering frequency ranging from 39.0% to 89.1% (Bothe, 2008). Brundage, Bothe, Lengeling, and Evans (2006) used the ratings of experienced judges as a standard to which the ratings of less-experienced clinicians and students are compared for accuracy. Results indicated that less experienced judges identified less stuttering events than more experienced judges. Such studies that use expert clinician ratings as a goal or standard assume that expert ratings are valid. Even though new methodologies and strategies have been suggested as an attempt to improve clinician skill in the observation of stuttering events and more highly experienced observers have been used as a standard of comparison, little research has addressed whether or not clinician observations are *valid.*

1.2.1 Validity of Observer-based Methods

For observer-based methods of evaluating stuttering, adequate levels of reliability are often used to imply adequate validity (Perkins, 1990). Perkins pointed out that the argument in favor for listener perception is circular. Because observer-based methods of evaluating stuttering have been used for so long in the field of speech-language pathology, and because some groups of raters have shown seemingly adequate levels of reliability (Hulit, 1978; Riley, 2009), observer-based methods have been considered valid. It means little to say that results are reliable if the

analysis was incorrect to begin with (Schiavetti et al., 2011). Regardless, even if one were to accept the notion that reliability could imply validity, a problem remains because observer reliability for some stuttering behaviors has not been thoroughly established. This applies to the current study of physical tension during moments of stuttering. For example, even with commonly used diagnostic tools such as the SSI-4, the published reliability of physical concomitants by experienced and trained observers is low, 82.9 with a range of 50.0 to 100.0 (p. 16). There are no published reliability measures using the research team (Riley, 2009). Despite low reliability on the physical concomitant section of the SSI-4, it remains one of the most widely used assessments of stuttering severity (Hall et al., 1987; Howell, Soukup-Ascencao, Davis, & Rusbridge, 2011; Lewis, 1995).

1.2.2 The Stuttering Severity Instrument (Riley, 2009)

The Stuttering Severity Instrument (Riley, 2009), currently in its 4th edition, uses clinician observations of people who stutter speaking in order to determine stuttering severity. Based in large part on the Iowa Scale for Rating Severity of Stuttering (Johnson, Darley, & Spriestersbach, 1963), the SSI-4 determines stuttering severity by evaluating three areas: percent stuttered syllables, average duration, and physical concomitants. The reliability of all three sections has been questioned with research showing lower reliability scores than those of the published assessment. (Hall et al., 1987; Lewis, 1995).

According to the instructions for the SSI-4, percent stuttered syllables are recorded for adults via both a reading task and a speaking task. The reading task may be omitted if the child is too young to read. Higher stuttering frequencies correspond to higher task scores. For example, on the speaking task, a frequency of stuttering 4% equates to a task score of 5, while

20% yields a task score of 9. Duration of stuttering is evaluated by averaging the three longest stuttering events timed to the nearest $1/10^{th}$ of a second. Longer average durations correspond to a higher scaled score, e.g. 2 seconds is a score of 8, while 10 seconds is a score of 14. The published assessment does not explain how point values were derived.

The physical concomitant score of the SSI is comprised of four categories: distracting sounds, facial grimaces, head movements, and movements of the extremities. See table below:

Table 1. Physical Concomitants (Riley, 2009, pp.8-9)

Distracting Sounds	Noisy breathing, whistling, sniffing, blowing, clicking sounds
Facial Grimaces	Jaw jerking, tongue protruding, lip pressing, jaw muscles tense
Head Movements	Back, forward, turning away, poor eye contact, constant looking around
Movements of the Extremities	Arm and hand movement, hands about the face, torso movement, leg movements, foot-tapping, or swinging

Each of these four categories is classified in terms of "levels of distraction" on a scale of 0 to 5. A score of 0 is "none" while a score of 5 is "severe and painful looking." Each section is then added together for a total physical concomitant score ranging from 0 to 20. Each section is given equal importance and influence to the total physical concomitant score. The total physical concomitant score is then added to the total frequency score and total duration score. When combined, these three scores give the total overall score.

This design leaves several questions unanswered. Though the SSI manual does explain what movements fall within each category, physical tension may exist in absence of observed movement and go unobserved using the SS-4. Another area of concern with the SSI physical concomitant section is that it limits locations of possible physical tension during moments of stuttering. It is plausible that physical tension during moments of stuttering could be manifested in muscle groups that are not encompassed by any of the categories used in the SSI. Specifically, the SSI's categories of facial grimaces, head movements, and movements of the extremities may not encompass areas such as the front, back, and inside of the throat, as well as the chest, and the abdomen, all of which have been reported to be common areas of physical tension during stuttering (Snidecor, 1955). Because it both limits and overgeneralizes areas of physical tension, the SSI-4 may not provide accurate insights into the true nature of the physical tension experienced by a person during moments of stuttering.

Also, clear distinctions between each level of distraction are not provided (Riley, 2009). What differentiates a moment of stuttering with a distraction score of "1- not noticeable unless looking for it" and "2-barely noticeable to casual observer" is not clear. The same is true of a score of "5-severe and painful looking" from a "3- distracting" or "4- very distracting." What is distracting to one observer may not be as distracting to another. This may be one reason that reliability data has been found to be so low (Hall et al., 1987; Lewis, 1995). Though the SSI-4 manual includes a section on training clinicians in counting percent stuttered syllables (Riley, 2009, p. 6), it does not provide a section on training clinicians observing and rating physical concomitants. This ambiguity may contribute to poor agreement between observer severity ratings. Hall (1987) stated "a rating from a single judge cannot be interpreted with confidence,

since other judges tend to place the stutter into a different severity category 20% to 30% of the time" (p. 171). This makes inter-rater comparisons of physical concomitant scores questionable.

Covert stuttering behaviors (also called "interiorized stuttering;" see Douglass & Quarrington, 1952) are not perceptible to the listener or measurable through instrumental assessment (Guntupalli et al., 2006; Murphy, Quesal, & Gulker, 2007). These behaviors occur at deeper levels within the speech system such as respiratory, laryngeal, and articulatory systems (Guntupalli et al., 2006). With physical tension, it is possible that a person who stutters covertly and non-covertly may show no visible signs in the therapy room but experience significant tension in real-world situations.

Variability is also a contributing factor that influences the validity of one-time assessments of physical tension. Frequency and degree of stuttering have been shown to vary from situation to situation and from day to day (Constantino, 2012). It is possible that degree and location of tension vary in a similar way. A one-time measurement may be inadequate for ascertaining the overall influence and negative impact physical tension has on the speaker, e.g. SSI-4.

The SSI-4 physical concomitant section does provide reliability data that is based on the ratings of "experienced examiners" (Riley, 2009, p. 16). Agreement for five samples ranged from 59.8 to 97.5 with average inter-judge agreements of 82.9 (Riley, 2009). The SSI-4 manual states that because frequency, duration, and physical concomitants are the three factors of stuttering severity, all three should positively correlate with each other (Riley, 2009). The correlation coefficients of the physical concomitant section are .68, .76, and .77 for preschoolers, children, and adults, respectively, with total scores (Riley, 2009, p. 19). Though ratings of physical concomitants may correlate with the SSI-4 total scores in predicting total stuttering

severity, physical concomitant scores may still correspond poorly with the speaker's experience of physical tension during moments of stuttering.

Clinically relevant physical tension may exist in degrees and locations that are overlooked by observer-based methods. Because observer ratings may be questionable, some locations of physical tension may not be perceivable, and degrees of tension may be difficult to differentiate, the validity of observer-based methods of evaluating physical tension may be suspect.

1.3 SELF-REPORTED MEASURES

What a clinician sees in the therapy room may not be completely indicative of a person's overall negative impact caused by the stuttering disorder (Murphy et al., 2007; Van Riper, 1973). Self-reports may provide information when speaker and observer perceptions differ. Self-reported measures of aspects of the stuttering disorder also provide a picture of the speaker's experience of stuttering in situations where clinician-observation is not possible. One-time evaluations do not capture the variability of stuttering (Constantino, 2012; Silverman, 1971). The clinical setting may be a low stress environment where higher levels of comfort may affect the client's speech (Guntupalli et al., 2006). Self-reports of situational hierarchies may help present a more accurate picture of stuttering severity and may also help track treatment benefits (Brutten & Shoemaker, 1967). Treatment benefits often diminish over time (Craig, 1998), and self-reports may help clinicians more accurately judge treatment outcomes (Guntupalli et al., 2006).

Many specific aspects of the stuttering disorder may be evaluated with self-reported measures. These include speech naturalness (Finn & Ingham, 1994; Ingham, Ingham, Onslow, & Finn, 1989), quality of life (Craig, Blumgart, & Tran, 2009; Johnson, 1967; Yaruss, 2010; Yaruss & Quesal, 2006), overall stuttering severity (O'Brian, Packman, & Onslow, 2004), and speech effort (Cordes & Ingham, 1997). Specifically, self-reported scales of speech naturalness have been shown to be reliable in both immediate and delayed tasks, though immediate tasks corresponded to lower reliability scores (Finn & Ingham, 1994). One reason for this discrepancy may be that on-line tasks are more difficult—requiring the extra step of self-judgments of naturalness in addition to language formulation, motor-planning, and execution.

Determining the total impact of the stuttering disorder on a person's quality of life requires self-reported measures because some aspects of the disorder are not observable. Yaruss & Quesal (2004) illustrated how the World Health Organization's *International Classification of Functioning, Disability, and Health* (ICF; WHO, 2001) can be used as a framework to describe the full extent of the stuttering disorder on speakers' lives. Describing the speaker's experience of stuttering within the ICF framework entails three major areas: Body function and structure, personal factors and environmental contextual factors, and activity/participation. Some of these areas, such as activity limitations/participation restrictions or affective and cognitive personal factors, may be more easily assessed via self-report. A client knows how his or her speech affects self-esteem and restricts participation in various areas of life, though self-denial and low self-awareness may be a problem. As with people who stutter covertly (Murphy et al., 2007), education about stuttering, guided hierarchical practice, and introduction to other people who stutter may be necessary.

Published measures of the effects of the stuttering disorder often use self-report. The *Iowa Scale of Attitudes Toward Stuttering* (Ammons & Johnson, 1944), the *Perceptions of Stuttering Inventory (Woolf, 1967)*, the *Locus of Control of Behavior* (Craig, Franklin, & Andrews, 1984), are a few examples of non-standardized self-reported assessments of stuttering severity. The *Scale of Communication Attitudes* (*S*-Scale) created by Erickson (1969) was developed to be a objective measure of stuttering attitude. It is comprised of 39 true or false questions and normed on 120 people who stutter and 144 people who do not. The idea behind the scale is that there are distinct differences in the attitudes of people who stutter and those who do not. The S24 scale (Andrews & Cutler, 1974) was developed from the S-scale. The S24

contains 24 questions and has demonstrated high construct validity when compared to other similar assessments (Franic & Bothe, 2008).

The OASES (Yaruss & Quesal, 2006, 2010) determines a speaker's overall experience of stuttering through self-report. Although the OASES has been shown to be a reliable and valid measure of adverse impact of stuttering, only three out of the 100 questions on the assessment specifically deal with physical tension. They are:

- How often do you experience physical tension when stuttering?

- How often do you experience physical tension when speaking fluently?

-How often do you exhibit eye blinks, facial grimaces, arm movements, etc. when stuttering?

A person's answers are recorded by frequency of occurrence—never, rarely, sometimes, often, and always. Although it may be effective at gaining an overall impression of physical tension, the OASES by design does not give specific details about locations and degrees of physical tension within the body during specific moments of stuttering.

Evaluating physical tension via self-reports offers a possible solution to the problems associated with observer-based methods. As discussed earlier, observer-based methods may misrepresent certain stuttering behaviors and lead to poor assessment outcomes through unreliable and invalid measurement (Cordes & Ingham, 1994; Ham, 1989). The historical solution to this problem was to look for ways that made these observations more reliable and valid (Cordes & Ingham, 1996; Yaruss, 1998).

Perhaps a better approach would be to find a more valid and reliable means of assessment. Guntupalli (2006) puts it best by saying, "Our field continues to think that we only need to change the techniques, but fails to understand that the measurement tools have also failed

us…" (p. 4). More information about the speaker's experience of physical tension is necessary for better assessment and therapeutic outcomes. Unfortunately, at present, little information exists about the relationship between self-reported measures and clinician-based observations of physical tension. Therefore, the primary purposes of this study were to explore the possibility of using self-reported measures for describing the perception of the location and degree of physical tension during moments of stuttering and to compare these self-reports with more traditional clinician-based observations.

2.0 METHODS

In this study, the self-reports of physical tension in speakers who stutter were compared to observations of physical tension completed by stuttering specialists. The two independent variables were rater group (people who stutter vs. stuttering specialists) and method of rating perceived physical tension (the Perception of Physical Tension Form and the SSI-4 Physical Concomitant Scale). Data were compared descriptively and statistically to test the null hypothesis that there was no difference between the speakers' and clinicians' perceptions of physical tension across assessments. It was anticipated that people who stutter were able to perceive aspects of physical tension that observers cannot perceive; this study helped to determine the degree and nature of these potential differences. A thematic analysis was undertaken on qualitative data taken from a conversation with the speakers who stutter to examine their experience with physical tension during moments of stuttering.

2.1 PARTICIPANTS

Participants for this study were one group of ten adults who stutter and one group of two board-recognized specialists in fluency disorders (BRS-FD). All participants who stutter met screening criteria (see Appendix E).

2.1.1 Adults Who Stutter

Because this was an initial study, it was deemed by investigator that ten participants who stutter were sufficient for this purpose and to provide a range of possible stuttering behaviors associated with physical tension. No exclusion was made based on whether or not the participant was currently in therapy, but information about their present and prior participation in therapy was collected for consideration of the potential effects of treatment on physical tension. Five females and five males were recruited based on personal contacts of the investigator. They were recruited in a manner consistent with the University of Pittsburgh guidelines and gave informed consent prior to their participation in the study. The individuals who stutter were over the age of 21, with onset of stuttering during childhood based on self-report, and self-identified as being a person who stutters at the time of screening procedures. Individuals were excluded if they self-reported any speech, language, hearing, physiological or neurological disorder other than stuttering. This confirmation limited potential confounding factors.

2.1.2 Board Recognized Specialists in Fluency Disorders (BRS-FD)

Two practicing board-recognized specialists in fluency disorders (BRS-FD) were selected to evaluate physical tension in the speech of the ten individuals who stutter. The participants were recruited based on personal contacts of the investigator's thesis advisor in a manner consistent with the University of Pittsburgh IRB guidelines. Both gave informed consent prior to their participation in the study.

2.2 DATA COLLECTION

2.2.1 Tasks- Adults Who Stutter

All ten participants who stutter engaged in three speaking tasks: one spontaneous speech sample, one oral reading task, and one conversation task. The spontaneous speech, oral reading, and conversation tasks were audio-video recorded for data analysis.

2.2.1.1 Spontaneous Speech and Oral Reading Task

The spontaneous speaking task consisted of a monologue of 150-300 uninterrupted syllables. The speech sample was collected in accordance with the assessment instructions in the SSI-4 (Riley, 2009). The investigator started by asking participants to "tell me about your job." If needed, additional prompts were provided the investigator to encourage the speakers to keep talking and provide a complete sample. Such prompts will consist of short phrases such as "what was your average day like?" or "What was that like?"

The reading task consisting of a reading of one SSI-4 passage. Passage XI, XII, XIII, or XIV of the SSI-4 (Appendix C) was selected at random by the investigator. After finishing both speech and reading samples, each participant immediately watched themselves on video and rated themselves using the physical concomitant section of the SSI-4. Each participant viewed the sample again and rated himself or herself using the Perception of Physical Tension Form developed for this study (Appendix B).

2.2.1.2 Conversation Task

Each participant had a conversation with the investigator, which lasted approximately 15 minutes, or longer as needed due to the variability of stuttering and the varying severities of the participants. No specific time constraint was imposed to allow the speaker to say exactly what they wanted to say. The conversation was audio and video recorded so that data could be analyzed. The purpose of the conversation was to discuss the speaker's experience of physical tension. Follow-up questions were asked, including questions such as:

- Does physical tension change over time or is it the same?
- What do you think other people see when you are experiencing physical tension?
- What is the tension like?
- How long does it seem to last?
- Is there anything you can do to reduce the tension?

2.2.2 Tasks- Board Recognized Specialists in Fluency Disorders

The board recognized specialists (BRS-FD) evaluated the oral reading task and spontaneous speech sample of each adult who stutters using the protocols of the SSI-4. Upon completion, each clinician viewed the samples again and rated each participant using the Perception of Physical Tension Form (Appendix B). Each clinician evaluated the speech samples of all 10 participants who stutter.

2.2.3 Data Collection

The sessions with the individuals who stutter took place in a quiet room on the University of Pittsburgh's campus. The room was the same for all participants who stutter. Audiovisual data was collected with one camera that focused on the speaker anteriorly. The speaker was seated in a non-swivel chair. The camera had a clear view of the person from head to toe. This set-up allowed for all possible areas of physical tension to be observed. In order that the SSI-4 was administered according to protocol, the tasks were done in the same order for every participant—spontaneous speech sample then oral reading task. The conversation task took place afterward. The specialists evaluated the recorded audiovisual samples (speaking and reading tasks) of the participants who stutter using the SSI-4.

2.2.3.1 Standardization

In order to ensure that all of the participants who stutter had as similar an experience as possible to each other, the procedures that the investigator used to conduct the sessions were standardized. The verbal directions for every task were stored in a binder. The investigator opened the binder and read the directions off the page for every participant. These instructions appear in appendix D. This was done to ensure that the investigator did not treat each participant differently.

2.3 DATA ANALYSIS

Data collected consisted of the Conversation Questionnaire (Appendix A), the Perception of Physical Tension Form (Appendix B), the physical concomitant sections of the SSI-4, and the

complete *Stuttering Severity Instrument-Fourth Edition* (SSI-4; Riley, 2009) completed by the BRS-FDs. SSI-4 total score, frequency, and duration sub-scores were compared using a Wilcoxon signed-rank pairs test and Spearman's Rho correlation coefficient. For clinician to speaker comparisons on SSI-4 data, inter-observer agreement was calculated using the following formula, [(A/B) x 100)] where A is the number of agreements and B is the total number of possible agreements. Data from the perception of physical tension form were compared descriptively.

The conversation task with the adults who stutter was analyzed through a thematic analysis consistent with Boyatzis (1998). The principle investigator used the strategies of summarizing, reflecting, and clarifying to ensure understanding (Bricker-Katz, Lincoln, & McCabe, 2010). Each session was transcribed verbatim using a word processing program. The investigator read each transcript multiple times, highlighted recurring themes and sub-themes of each speaker. Tangential and extraneous comments not pertaining to the topic of the experience of physical tension were excluded from analysis. Participants' disfluencies were not recorded in the transcript to minimize distraction when compiling themes and sub-themes (see Bricker-Katz et al., 2010; Plexico, Manning, & Levitt, 2009). Upon completion, the thesis advisor performed a reliability check on these data, following the exact same procedures as the principle investigator. A consensus on differing interpretations of themes and sub-themes was formed between the principle investigator and the thesis advisor.

2.4 RELIABILITY ASSESSMENT

In order to determine reliability of clinician data, intra-judge reliability measures were performed. 20% of sample data (2 participants who stutter) were selected at random by the author and given to both clinicians for re-evaluation 3 weeks after the original assessments. These scores provided a range of possible ratings. Mean difference was calculated for components of the SSI-4 and the Perception of Physical Tension Form, developed for this study. Data are represented below.

Table 2. SSI-4 Reliability Assessment

	Clinician 1		Clinician 2	
	Participant 3	Participant 7	Participant 3	Participant 7
Frequency	5.5	0	.5	.5
Duration	1	1	0	0
Distracting Sounds	0	1	0	0
Facial Grimace	.5	0	.5	.5
Head Movements	.5	0	.5	.5
Movement of Extremities	0	0	1	0

Units are SSI-4 scaled scores

With the exception of the frequency sub-score of the SSI-4, clinician 1 had a maximum mean difference of 1 scaled score on all original and follow-up scores. Clinician 2 had a maximum mean difference of 1 scaled score on all original and follow-up scores. Intra-judge reliability on the SSI-4 was high for both clinicians.

Table 3. Perception of Physical Tension Form Reliability Assessment

	Clinician 1		Clinician 2	
	Participant 3	Participant 7	Participant 3	Participant 7
Eyes	.5	.5	0	0
Lips	1	1.5	0	1
Tongue	.5	.5	.5	1
Cheeks	.5	1	0	.5
Throat	1	3	0	1
Vocal Folds	1.5	1	.5	1.5
Chest	1	1.5	0	0
Abdomen	1	0	0	0

Clinician 1 demonstrated mixed intra-judge reliability between original and follow-up scores on the Perception of Physical Tension Form. Average mean difference ranged from 0 to 3 units. Clinician 2 demonstrated higher intra-judge reliability with average mean scores ranging from 0 to 1.5 units.

3.0 RESULTS

3.1 QUALITATIVE DATA

Table 4 describes the data collected. Themes and sub-themes are discussed below and summarized in Table 5. When possible, non-pertinent data from topics that were not stuttering-related were omitted. Examples of omitted data include small-talk with the investigator and anecdotal side stories that were tangential to the conversation topic. Separating out the speakers' experience of physical tension from the speakers' experience of other aspects of the stuttering disorder (e.g. speech fluency) was not always possible due to ambiguity. In these cases where the specific aspect of the stuttering experience addressed by the participant was unclear, data were included for analysis.

Table 4. Characteristics of Transcripts

Sample:	Audio/Video Length:	Words in transcript:
Participant 1	6:43	343
Participant 2	11:09	937
Participant 3	16:12	1635
Participant 4	19:10	1874
Participant 5	9:26	889
Participant 6	15:24	1189
Participant 7	5:50	416
Participant 8	17:27	604
Participant 9	15:32	939
Participant 10	10:14	881

Table 5. Summary of Themes

Theme:	**Subtheme:**
Location of Physical Tension	Change over time
	Inaudible tension
Degree and Duration of Physical Tension	Perceptually longer duration
	Variability
	Change over time
Management of Physical Tension	Situational Variability
	Hiding as a management tool
Perception of Others	Observer/Speaker Agreement
Perception of Self	Variability of Self Perception
	Acceptance
Present Study	Using the two forms
	Observer/Speaker Agreement

3.1.1 Theme: Locations of Physical Tension

When asked to describe their experience of physical tension, location was often first mentioned. The group of speakers mentioned a range of locations including the eyes, mouth, lips, throat, vocal folds, and chest. Most participants mentioned a few locations and areas. No single location or area was mentioned by all participants. This suggests that a speaker's experience of physical tension may be individualized.

Participant 1– It's in my throat, a lot of tension in my mouth.. I'm holding my breath I know.

Participant 2– Lips clench, mouth opens up, my chest clenches

Participant 3– …tight [hand motions]…and in my throat.

Participant 4– In my eyes, you squint and your facial muscles tighten up

Participant 5– I felt it in my chest and in my vocal folds

Participant 6– I felt tension which I do sometimes with my tongue and vocal cords.

Participant 7– My physical tension is mostly in my vocal folds.

Participant 8– I feel most of my tension in my voice and my throat.

Participant 9– Usually very tense around the throat and vocal chords and here [motioned along throat], and the lips…I frequently have a fist clenched when talking.

Participant 10- I think in general it's mostly in my upper chest or my lips.

3.1.1.1 Change Over Time

Four participants spoke about how locations and degrees of physical tension have changed over time in the specific location of the stomach. It is possible that these quotes may relate to the relationship between mental effort and physical effort (see Ingham et al., 2009).

Participant 3- For years I carried it like a knot in my stomach.

Participant 6- I don't feel that uneasiness in my stomach that I used to.

Participant 9- I feel like over the years it's gravitated away from my stomach.

Participant 10- When I stuttered a lot more severely, it was definitely more in my stomach, or more extreme in my stomach.

3.1.1.2 Inaudible Tension

Two participants spoke about tension in the vocal folds that occurs in the absence of sound. This suggests that some speakers perceive tension that they think cannot be perceived audibly.

Participant 3- I'm having a block and it's like the air can't [just stops], I can breathe but I can't make my vocal cords move.

Participant 7- [In the vocal folds] where I experience blocks, sometimes silent and sometimes there is some air going through, but there's still tension there.

3.1.2 Theme: Duration and Degree of Physical Tension

Participants reported various lengths of time for physical tension. This may coincide with the variable nature of the stuttering disorder experienced by speakers.

Participant 1- Couple of seconds… I think I must feel tense most of the time though.

Participant 2- Very long, the blocks can last half a second, they can last several seconds.

Participant 3- It can be extremely long.

Participant 5- If I successfully evaded a moment of stuttering I would just feel the physical tension in my vocal folds or chest fleetingly.

Participant 7- I have to say I don't think right now I have physical tension that lasts for a long time, I think it's pretty short, maybe up to half of a second.

Participant 10- In the moment, it definitely lasts longer than the block but it falls off pretty quickly.

3.1.2.1 Perceptually Longer Duration

Two participants spoke about tension that was perceptually longer in duration to them in the moment of stuttering. This suggests that the moment of physical tension may be longer than the moment of perceived stuttering.

Participant 1- It's not long, but it seems long at the time.

Participant 10- My anticipatory anxiety could go on for an infinite period of time as long as I was thinking about the upcoming speaking situation that was creating the tension.

3.1.2.2 Variability

The duration and degree of physical tension was reported to vary by many factors such as situation, mental state, and time. This degree of variability may correspond to the variable nature of the stuttering disorder as a whole (see Constantino, 2012).

Participant 2- Depends on the situation, who I'm talking to, how nervous or excited or calm I am. The more I let the stutter bother me the worse it gets. The more I try to fight through it, the worse it gets. It just depends I guess.

Participant 3- Depending on the situation, [it can be extremely long].

Participant 4- So it's hard to say exactly because it's so dependent on so many factors.

Participant 5- I use to have to call other [omitted] about different information on [omitted] or whatever, that was probably when I had the most physical tension.

Participant 6- There are times when I'm at a loss to explain why for some reason I do have difficulty…You might be able to say it earlier in the conversation but then later in the conversation the tension is there.

Participant 7- It changes from month to month. That's why I said currently.

Participant 8- I usually always have tension and it's usually at about the same level but there are times and there are certain situations where it's a lot higher and that makes it a lot harder to speak…such as using the phone.

Participant 10- I think it changes on the function of the sound I'm making.

3.1.2.3 Change Over Time

Two participants spoke about how duration and degree of physical tension have changed over time.

Participant 7- It's changed a lot over time, in the past 26 years or so since I started stuttering.

Participant 9- Physical tension is not always there; when I was younger it was a lot more.

3.1.3 Theme: Management of Physical Tension

All participants spoke about numerous ways they manage physical tension including but not limited to breathing, light contact, pharmaceuticals, avoidance, and slower rate of speech. Though the methods of managing tension may vary from speaker to speaker, management was discussed as being an important aspect of living as a person who stutters who experiences increased levels of physical tension on a daily basis.

Participant 1- I try and push it out, the word out…taking a breath and letting it out slowly…just keeping everything relaxed.

Participant 2- It feels like I can't get less tense unless the situation changes.

Participant 3- When I'm in a good practicing it most likely will go away or if I use my targets [relaxation, breathing, starting vocal cords gently] to the point though where I feel that I don't sound abnormal.

Participant 4- I used to take half a valium when I used to talk…The only thing that I've ever learned that worked was pausing, talking slower, and breathing.

Participant 5- I try and minimize it with even more avoidance reduction than desensitization.

Participant 6- I know that if I touch my lips softly, there's no difficulty.

Participant 7- I don't want to avoid anymore but I don't think I intentionally reduce physical tension.

Participant 9- I try not to be too tired, or too drunk because my speech will be awful…taking a nice deep breath and waiting a good 7,8.9,10 seconds.

Participant 10- I have the speech goals so light contact, easy onset, I don't actually know if they work in isolation but I know that a belief that they work whether or not that be true or false, calm me down, that reduce my anticipatory anxiety, which in slows me down, and calms me in speaking situations.

3.1.3.1 Variability

Management of physical tension during stuttering was reported to vary by situation, time period, and mental state.

Participant 2- It feels like I can't get less tense unless the situation changes.

Participant 3- Sometimes they [the words] are not starting. There's no gentle nothing.

Participant 4- If I take deep breaths and the people I'm talking to are not in a rush and in a situation we're in now I'm more relaxed [with you].

Participant 6- I try and do that [touching lips softly] especially on the telephone.

Participant 8- It's after some time I feel less stressed out in a situation and it becomes easier.

3.1.3.2 Hiding as a management tool

Three participants mentioned hiding as a tool they used in the past as a way to manage physical tension. The fact that hiding was discussed as a "past" strategy suggests that the speakers found hiding unsuccessful.

Participant 4- I learned how to deal with it pretty well but it was sort of trying not to show it.

Participant 5- [I use to] switch words, adding a starter sound secretively that the listener wasn't too aware of, coughing or changing my breathing pattern or pushing out a sound…Because I wouldn't stay in the moment, I wouldn't let the moment happen.

Participant 7- How I've managed is to try and not to avoid at all. That in turn has reduced my physical tension., just the whole acceptance of stuttering-thing. Just being o.k. with stuttering has reduced my physical tension, I'm still stuttering but I'm not so tight, so tense and just struggling.

3.1.4 Theme: Perception of Others

Seven participants who stutter discussed how their views of the perception of others was affected by physical tension in their speech. Some speakers discussed surface-level characteristics such as overt tension. Others discussed possible negative feelings or reactions on the part of others. These perceived reactions from others may affect self-perception

Participant 1- Maybe a tense jaw?

Participant 4- I didn't want people looking at me or things like that.

Participant 5- As I become more of an overt stutterer I think that my the visibility of my physical tension has increased.

Participant 6- I think they see abnormalities in the way you form your lips, your lips might be quivering, you might be kind of locked up on a word, blocking.

Participant 8- I know that it mostly manifests in the muscles in my face, in my neck, in my eyes, in my eyebrows.

Participant 9- I think they [observer] notice any gross any major anything other than the norm.

Participant 10- Predominantly I would think they would see secondary behaviors…Even when tension is extreme I would argue that secondary behaviors especially slapping or twitching or whatever, I think that's more expected.

3.1.4.1 Observer/Speaker Agreement

Six participants reported that what they thought they were feeling would not be perceived by observers. This perceived disparity, real or imagined, suggests that speakers desire high agreement between themselves and observers.

Participant 5- They [my tense areas of chest and vocal cords] are not stereotypic associative patterns of stuttering that an unskilled listener would be aware of.

Participant 6- Nobody can see you but they know you're blocking I feel when you block.

Participant 7- Maybe my lips [and eyes] pressed tight together, even though I don't feel a lot of tension there, that's what people might see.

Participant 8- Whenever I was watching myself my face movements looked like a person you would see in a horror movie, the exorcist. That's what it looks like. But it doesn't ever feel as bad.

Participant 9- To the casual viewer, I don't think they notice much minor tension, or minor to them.

Participant 10- Right there I said “di di disruptiveness” [pseudostutter] and it was a little prolonged but I don’t think those are disruptive to the conversation. But if I was sweating and if I’m like this [facial grimace] then [conversation would be impacted].

Participant 10- I just don’t think there’s an awareness of stuttering, people don’t think that’s tension or maybe that’s stuttering, he just doesn’t know what he wants to order [food].

3.1.5 Theme: Negative Perception of Self

Three participants reported their self-perception was negatively affected by their experience with physical tension.

Participant 3- In real life situations I struggle because I want to sound normal I don’t want to sound to strange so it’s like a balancing act.

Participant 4- I didn’t show it but when it became really bad say blocking or in front of a class or something and I was embarrassed by it, especially when I first started teaching and it happened very badly.

Participant 10- In general I don’t like seeing myself and I don’t also think any person who has an insecurity is going to like to see that insecurity.

3.1.5.1 Positive Perception of Self

One participant reported their self-perception was positively affected by their experience with physical tension.

Participant 5- I don't mind as much when I have physical tension that appears to a listener to be associated with stuttering.

3.1.5.2 Variability

Three participants discussed how their self-perception varied in response to the variable nature of physical tension.

Participant 2- I'm sure that if you compare the speaking situations with a co-worker or anyone at work versus me talking to my sister it would be completely different and I would probably be a lot more tense at work even if I don't realize it.

Participant 4- [Sometimes] I just really couldn't control my speech at all and there I got real upset and it fed upon itself and that would last afterwards too. I would be really upset for the rest of the day or something, things like that hurts and you get tenser and depress and everything else.

Participant 6- Maybe they wanted to laugh [when I was blocking], I don't know. None of that bothers me anymore. It used to bother me though.

3.1.5.3 Acceptance

Two participants spoke the role acceptance has played in forming their self-perception.

Participant 3- I think there's times when there's lower levels that I don't even catch it [physical tension]. There's times when I just wanna say what I wanna say and I don't use my targets so whatever. And in that moment I don't really care [about managing].

Participant 5- I do think that tolerate it more and I don't mind that my physical tension manifests in more overtly recognized way.

3.1.6 Theme: Self-evaluation in the Present Study

Some participants reflected on their participation in the study and discussed their own awareness of their speech.

Participant 4 - I didn't feel a lot of tension when I was doing that and I was surprised that my face got as constricted as it did.

Participant 7- It's always difficult because, judging anything like that it's all-subjective, it's always hard. I'm questioning myself, am I tense there? I start thinking about it more, maybe I am tense in my cheeks, I don't know I've never noticed that.

3.1.6.1 Thoughts on Forms

Participants expressed opinions on using the forms in the session; some claiming it built awareness and some expressing preferences for one form or the other.

Participant 3- The second one [Perception of Tension Form] actually was more extensive, I mean it touched smaller and more things.

Participant 5- I think that the new form gives you more opportunities to specify specifically…there's areas to fill in.

Participant 8- The first form [SSI-4] didn't really make sense I mean it makes sense but I don't think it's asking the right questions.

Participant 9- I asked whether any random motions with the hands or what not are actually distracting notions? Generally speaking is something a distraction or is it a natural course of conversation, if it's not stuttering?

Participant 10- In terms of my eye blinking which I noticed on those videos I had some prolonged blinks. I don't think that's tension. I don't feel it, my eye lids in my opinion don't look like they're furled or curled. I think just shutting my eyes is a secondary behavior. I don't know the way you would like me to classify that. I don't consider that tension for the purpose of our conversation. I'm saying that's more of a tension free secondary behavior.

3.1.6.2 Observer/Speaker differences

Participant 5- If it [Perception of Physical Tension Form] is used as a listener based perception measure then I don't know that it's going to be that much more reliable than the SSI because I don't think unless we're just talking overt physical tension that either of them would be reliable.

Participant 8- I think it [my stutter] is more disruptive or so than distracting. Whenever I think of distracting that is a word that you use as an observer. My stutter is distracting to you but it's disruptive to me.

3.1.7 Summary of Themes

The subtheme of variability was found in many of the main listed themes. Other aspects of the stuttering disorder are highly variable and it appears that participants who stutter report variability with aspects relating to physical tension as well. The subtheme "change over time"

was found within the location and duration of physical tension themes. Interestingly, the themes of self-perception and acceptance may relate to how physical tension changes over time. Themes and subthemes are discussed in section 4.0.

3.2 QUANTITATIVE DATA

3.2.1 SSI-4 (Riley, 2009) BRS-FD Comparisons

Clinician data from the *Stuttering Severity Instrument* (SSI-4; Riley, 2009) were compiled. The clinicians' data were compared descriptively and statistically to examine to what degree the clinicians agreed with each other. Clinician data on the total score, frequency sub-score, and duration sub-score were compared descriptively and statistically. Data are represented numerically and graphically below.

A Wilcoxon Sign-Ranked Pairs Test showed that there was a statistically significant difference ($Z= 2.298$; $p = .022$) between each clinician on the SSI-4 Total Score. However, clinicians did generally agree on which speakers were more severe and which ones were less severe. A Spearman's rho revealed a statistically significant strong positive correlation between both sets of clinician data ($.79$, $p < .006$).

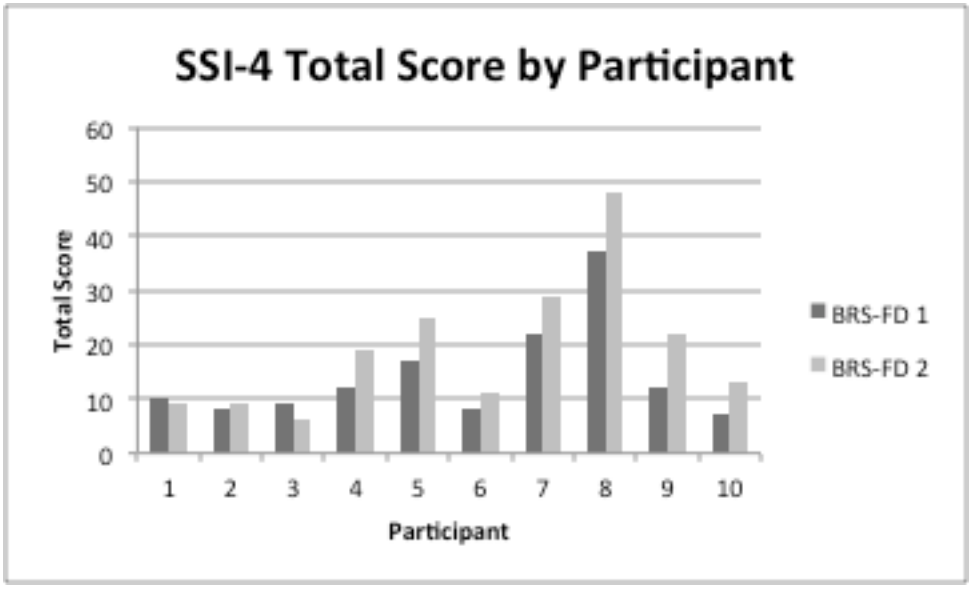

Figure 3. SSI-4 Total Score

Agreement between clinicians was shown for the frequency sub-score. Agreement did not vary by amount of stuttering. A Wilcoxon ranked signed paired test showed no statistically significant difference between both clinicians (Z=.586; p = .56) on the frequency sub-score.

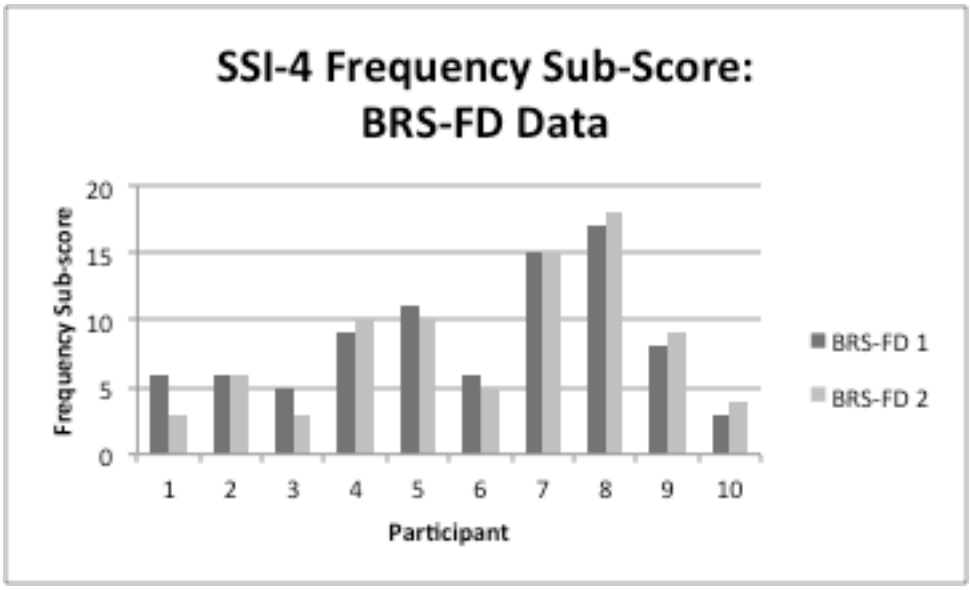

Figure 4. SSI-4 Frequency Sub-Score

A Wilcoxon ranked signed paired test showed a statistically significant difference between both clinicians (Z= 2.588; p = .01) on the duration sub-score. A Spearman's rho

revealed a statistically significant strong positive correlation between both sets of clinician data (.76, $p < .011$).

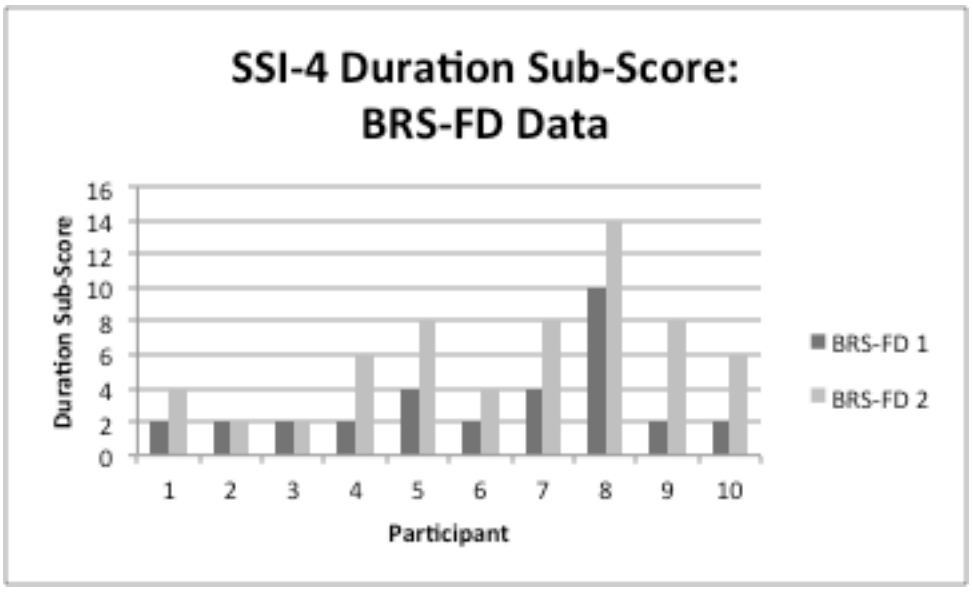

Figure 5. SSI-4 Duration Sub-Score

3.2.2 Physical Concomitant Scores: Clinician and Speaker

Clinician and speaker data were compared descriptively and statistically to explore the null hypothesis that there is no difference between clinician and speaker perception of physical tension as measured by the SSI-4 (Riley, 2009). Each subsection of the physical concomitant score was considered collectively and individually. These sections are distracting sounds, facial grimaces, head movements, and movements of the extremities. These sections added together yield the total physical concomitant score. The graph below represents participant agreement on the total physical concomitant score. Participants largely agreed on whether or not physical concomitants existed yet differed in the amount of perceived physical concomitants.

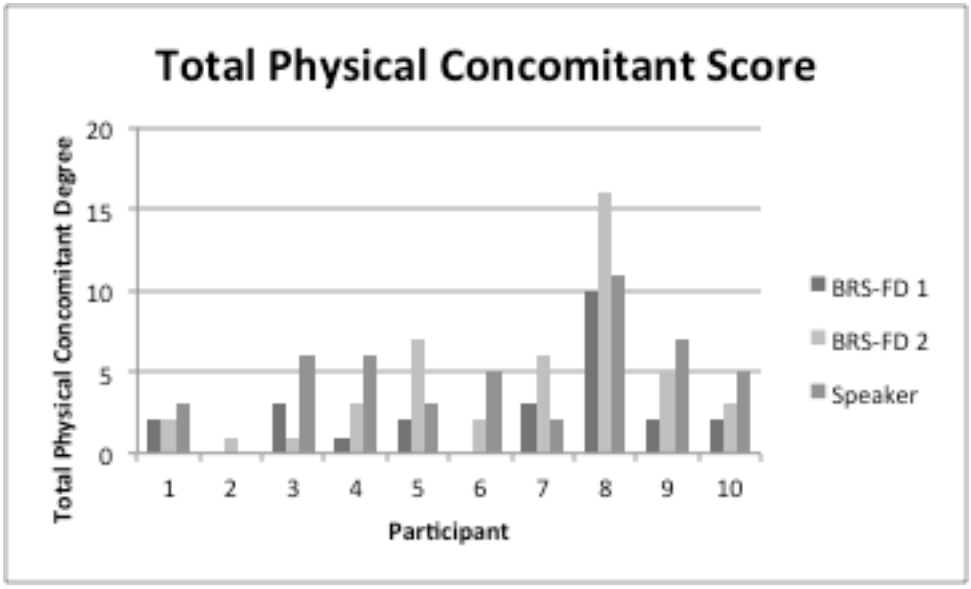

Figure 6. Total Physical Concomitant Score

3.2.2.1 Distracting Sounds

Inter-observer agreement was calculated for each clinician and group of participants. Clinician 1 and speakers had a point-by-point agreement of 70% while Clinician 2 and speakers had a point-by-point agreement of 70%.

Interestingly, no clinician agreed with any of the two participants who reported they had distracting sounds. Clinician 2 was the only clinician who agreed with participant 9 that distracting sounds existed but differed in degree. No clinician agreed with participant 10. Participant 8 did not agree with clinician 1.

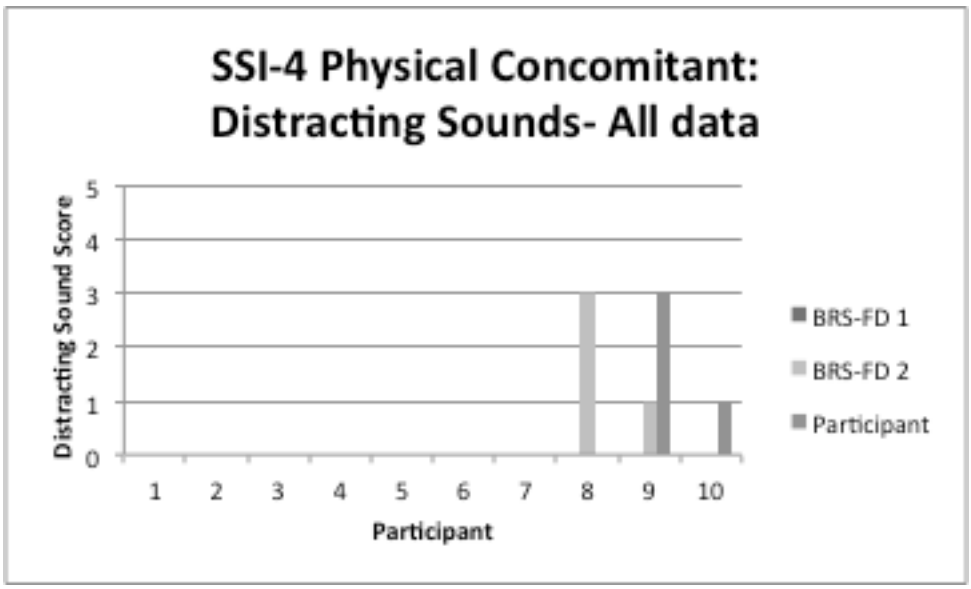

Figure 7. Physical Concomitant: Distracting Sounds

Table 6. Physical Concomitant- Distracting Sounds

Participant number	BRS-FD 1 Data	BRS-FD 2 Data	Speaker Data
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0
7	0	0	0
8	0	3	0
9	0	1	3
10	0	0	1

3.2.2.2 Facial Grimace

Agreement for the facial grimace component of the physical concomitant section was varied. One clinician was often found to agree with a speaker but seldom did both clinicians agree on individual participants. Exceptions are seen for participants who have higher levels of physical tension, ex. Participant 8.

Inter-observer agreement was calculated for each clinician and group of participants. Clinician 1 and speakers had a point-by-point agreement of 10% while Clinician 2 and speakers had a point-by-point agreement of 30%.

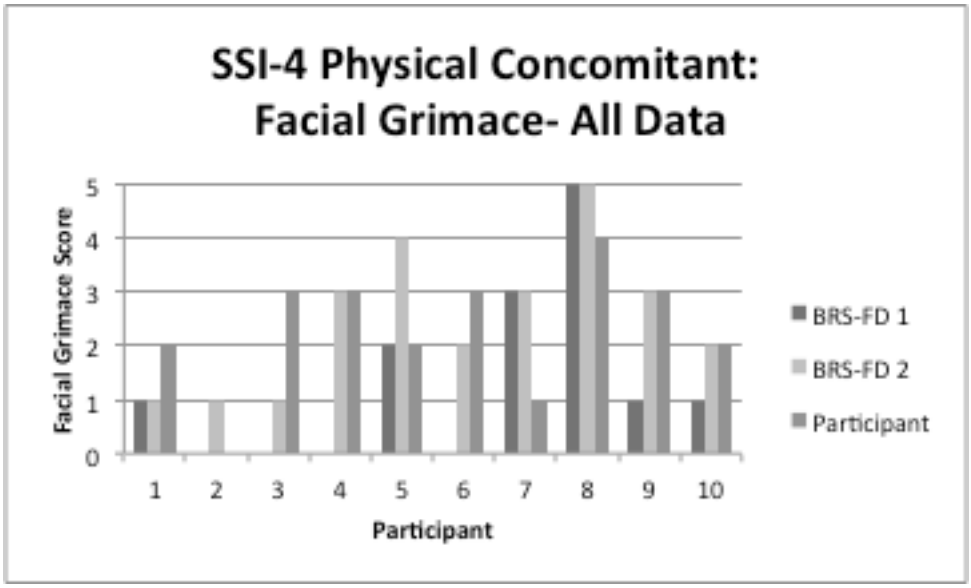

Figure 8. Physical Concomitant: Facial Grimace

Table 7. Physical Concomitant- Facial Grimace

Participant number	BRS-FD 1 Data	BRS-FD 2 Data	Speaker Data
1	1	1	2
2	0	1	0
3	0	1	3
4	0	3	3
5	2	4	2
6	0	2	3
7	3	3	1
8	5	5	4
9	1	3	3
10	1	2	2

3.2.2.3 Head Movement

Less agreement was found for the head movement component of the physical concomitant section than for the facial grimace section. More agreement was found with participants who had the highest and lowest levels of physical tension, e.g. participants 1, 2, 6 and 8, respectively. Inter-observer agreement was calculated for each clinician and group of participants. BRS-FD 1 and speakers had a point-by-point agreement of 30% while BRS-FD 2 and speakers had a point-by-point agreement of 50%.

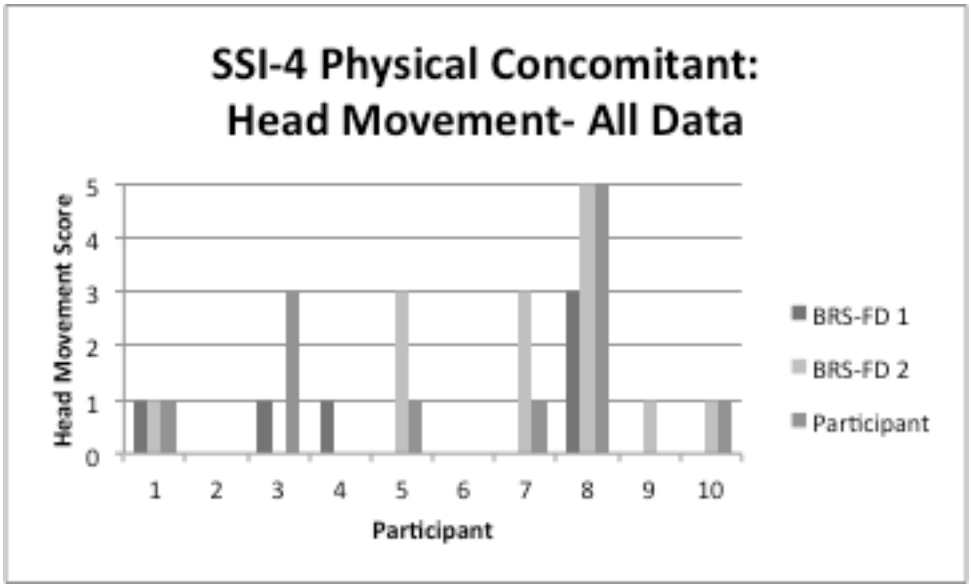

Figure 9. Physical Concomitant: Head Movement

Table 8. Physical Concomitant- Head Movement

Participant number	BRS-FD 1 Data	BRS-FD 2 Data	Speaker Data
1	1	1	1
2	0	0	0
3	1	0	3
4	1	0	0
5	0	3	1
6	0	0	0
7	0	3	1
8	3	5	5

(Table 8. continued)

Participant number	BRS-FD 1 Data	BRS-FD 2 Data	Speaker Data
9	0	1	0
10	0	1	1

3.2.2.4 Movements of Extremities

Less agreement was found for the movement of the extremities component of the physical concomitant section than the facial grimace section. However, more agreement was found with participants who had the highest levels of physical tension, e.g. participants 8, 9, and 10 (see figure 7 below). Inter-observer agreement was calculated for each clinician and group of participants. BRS-FD 1 and speakers had a point-by-point agreement of 40% while BRS-FD 2 and speakers had a point-by-point agreement of 50%. BRS-FD 2 agreed with all 5 speakers who said they had no movements of the extremities but disagreed with the 5 speakers who said they did have movements of the extremities.

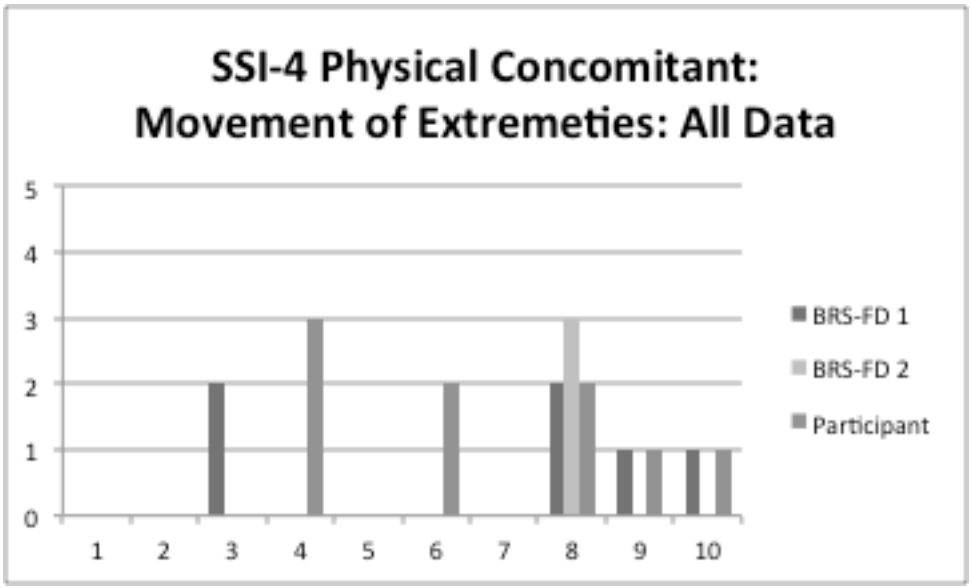

Figure 10. Physical Concomitant: Movement of Extremities

Table 9. Physical Concomitant- Movement of the Extremities

Participant number	BRS-FD 1 Data	BRS-FD 2 Data	Speaker Data
1	0	0	0
2	0	0	0
3	2	0	0
4	0	0	3
5	0	0	0
6	0	0	2
7	0	0	0
8	2	3	2
9	1	0	1
10	1	0	1

3.2.3 Perception of Physical Tension Form

3.2.3.1 People who stutter

Figure 11 represents data compiled from the participants who stutter using the Perception of Physical Tension Form. Each area reported was given a score of 1. Therefore, the maximum number of times an area could be reported was 10 for all 10 participants. Eyes, lips, tongue, cheeks, throat, vocal folds, chest, and abdomen were more commonly reported than other areas. (See Section 3.2.2.3 for comparison to clinicians)

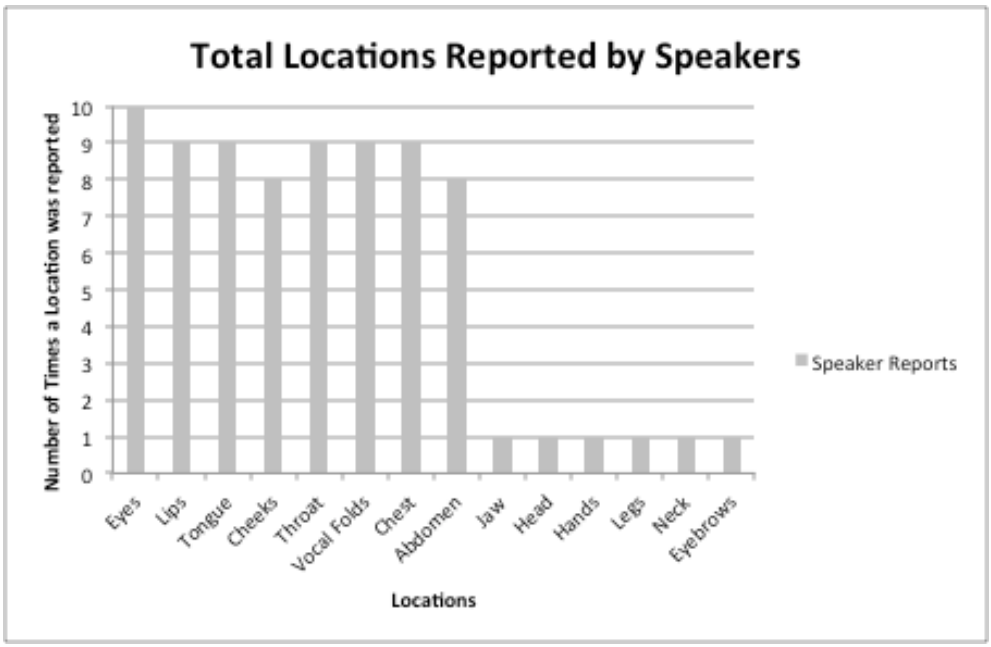

Figure 11. Perceived Tension in Locations

The graph below shows average degree by location reported by all speakers. Not only were certain locations reported more frequently (see above). But, these locations were reported to be more tense than other commonly reported areas.

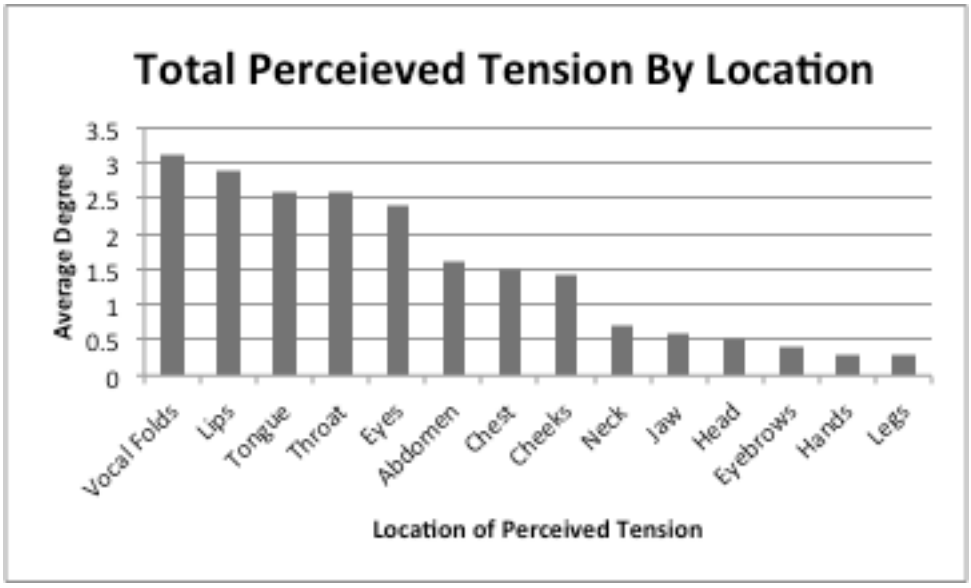

Figure 12. Total Perceived Tension of Speakers by Location

3.2.3.2 Clinicians

Inter-clinician agreement varied by location on the Perception of Physical Tension Form. The locations of the lips, cheeks, and chest showed higher inter-clinician agreement than did other areas. Section 3.2.3.3 shows speaker-clinician comparisons.

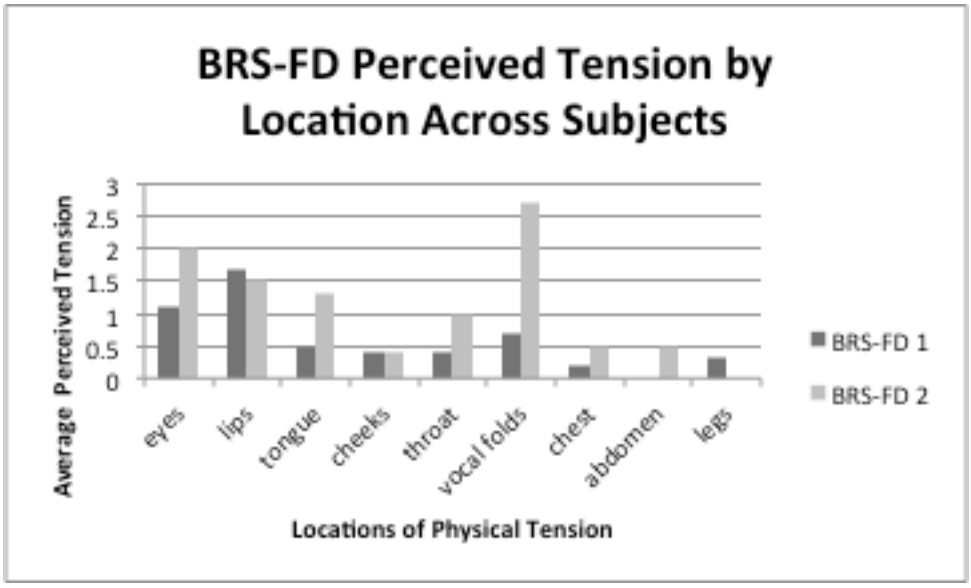

Figure 13. BRS-FD Perceived Tension by Location

3.2.3.3 Speaker and Clinician Comparisons

Speaker and clinician data from the Perception of Tension Form were compared and sorted by location in the body. Figure 11 represents all locations reported irrespective of degree of perceived tension. Each time a location was reported it was scored as a "1." So, each location could have a maximum number of 10 reports by each participant and each clinician. Generally, the locations of eyes, lips, tongue, and vocal folds had higher levels of agreement between speakers and clinicians than did other areas such as cheeks, throat, chest, and abdomen.

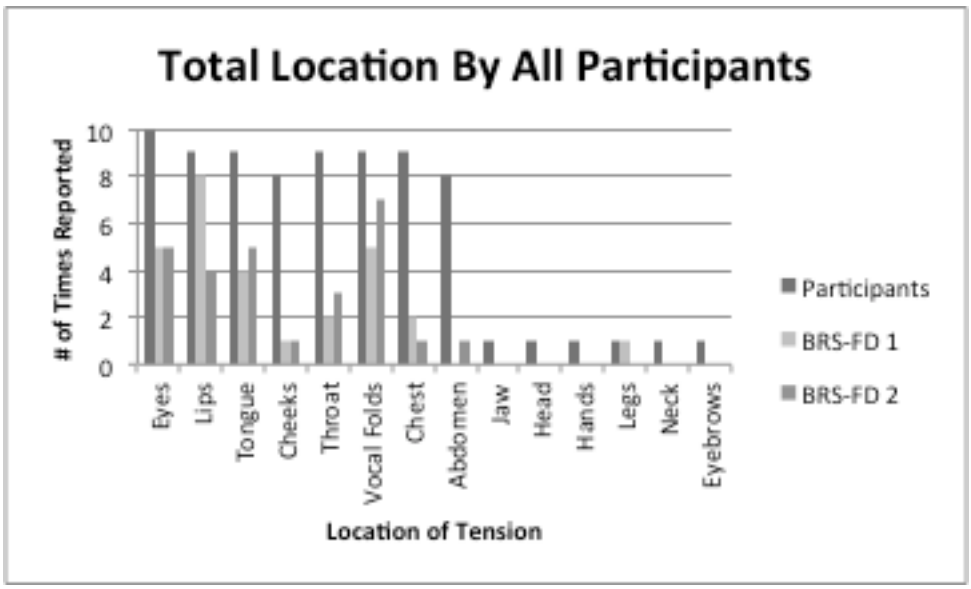

Figure 14. Total Locations Reported by All Participants

Individual graphs of perceived tension by location are found below. Note that clinician and speaker agreement was higher for all locations when more tension was perceived (see participant 8). Generally, the locations of the eyes, lips, tongue, and vocal folds had more agreement while the areas of cheeks, throat, chest, and abdomen had less agreement.

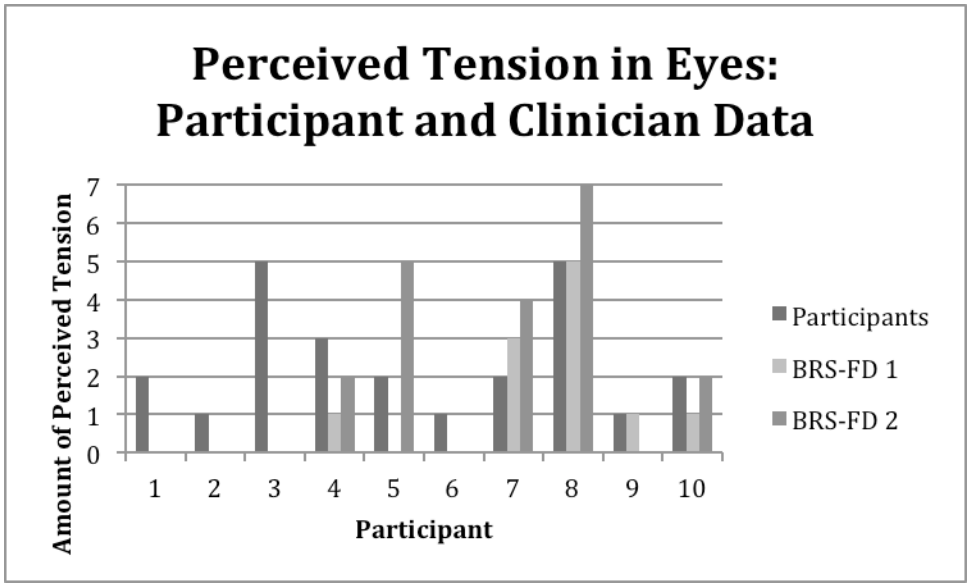

Figure 15. Location: Eyes

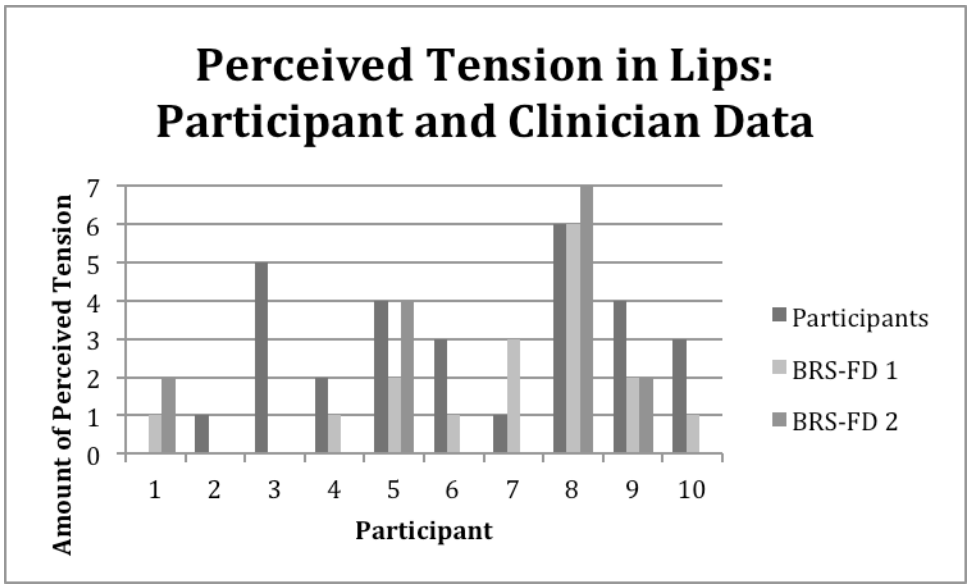

Figure 16. Location: Lips

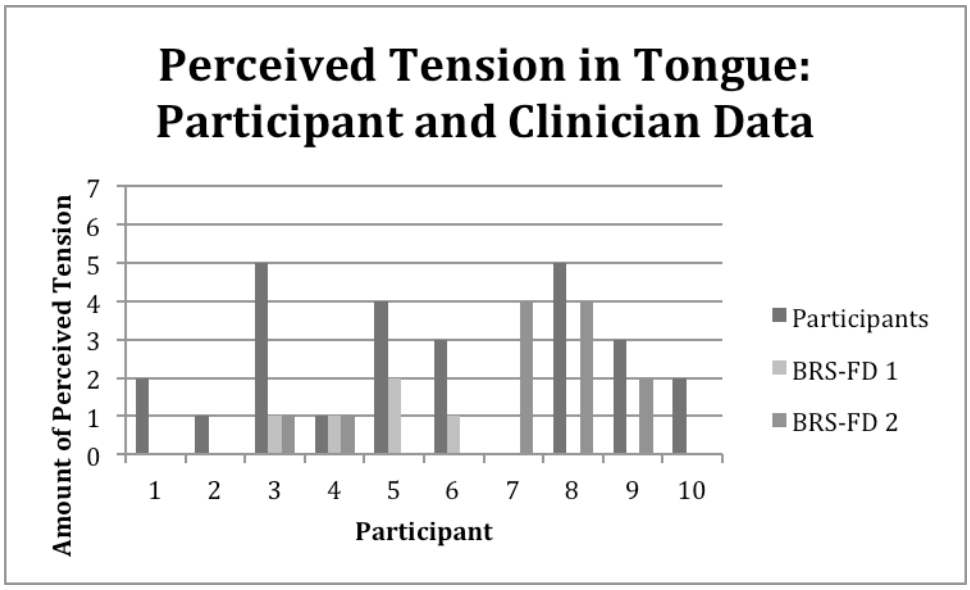

Figure 17. Location: Tongue

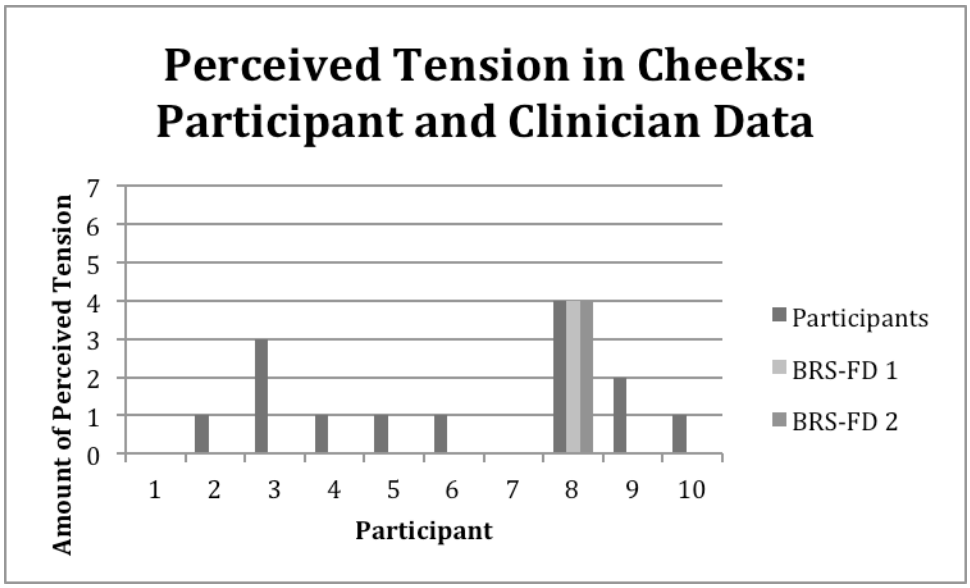

Figure 18. Location: Cheek

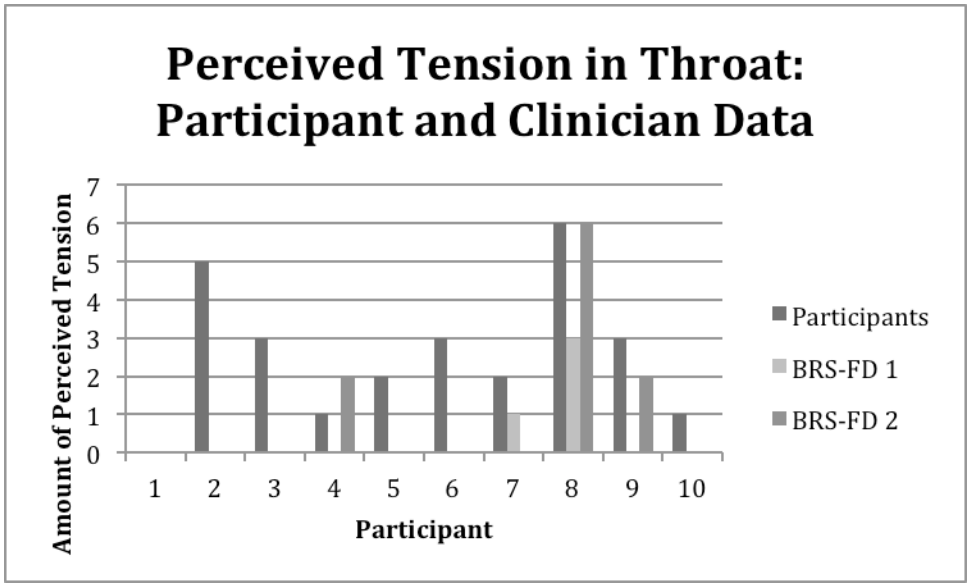

Figure 19. Location: Throat

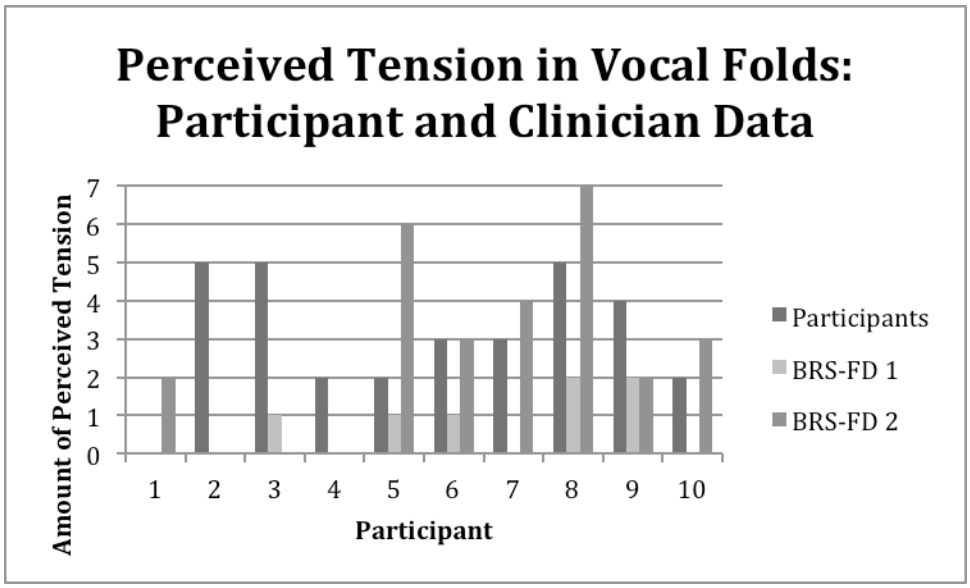

Figure 20. Location: Vocal Folds

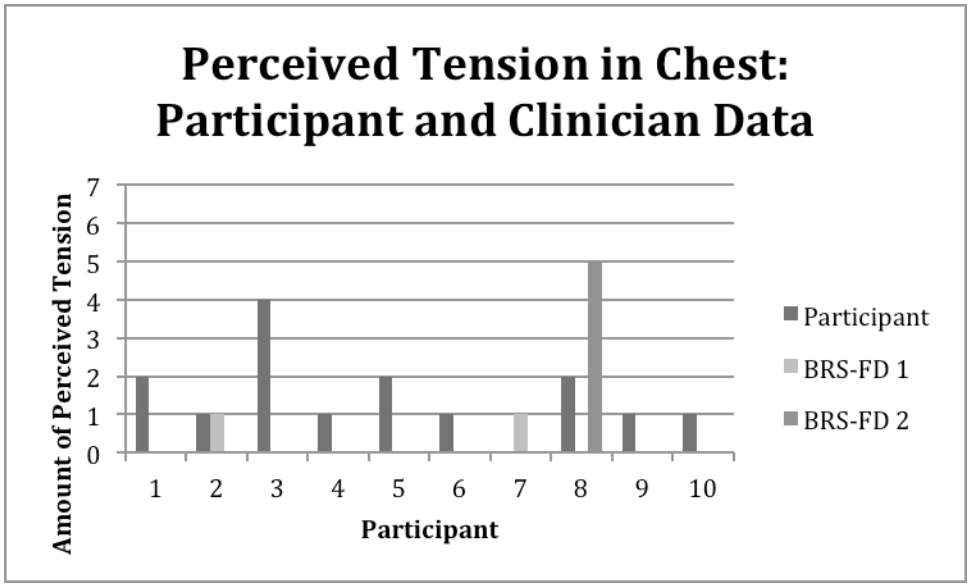

Figure 21. Location: Chest

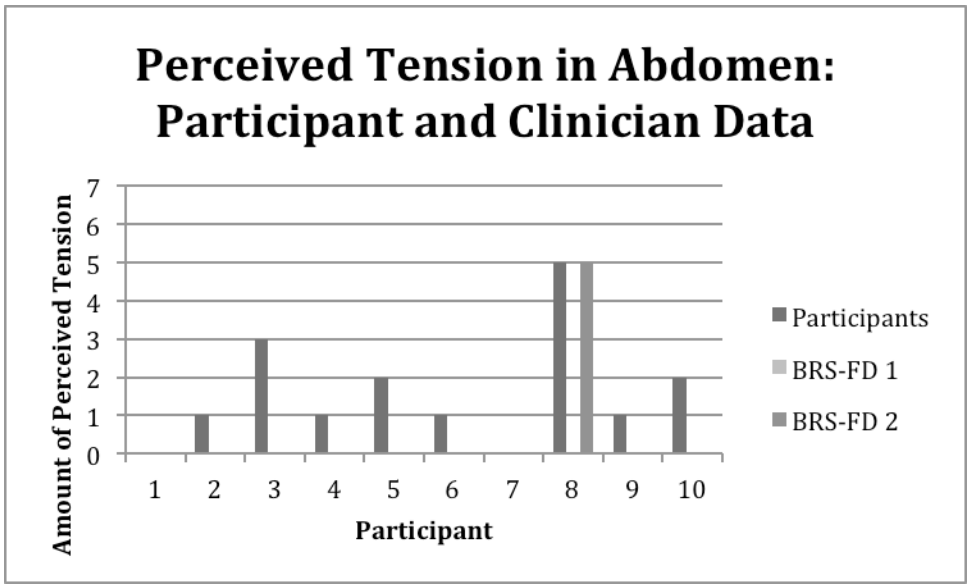

Figure 22. Location: Abdomen

3.2.3.4 Summary of Quantitative Data

Inter-clinician agreement on the SSI-4 was mixed. Inter-clinician agreement was high on the frequency sub-score. Clinician scores did also strongly correlate on the duration subscore and total score. Clinician-speaker agreement on the physical concomitant section of the SSI-4 was also varied with higher agreement on the facial grimace sub-section and lower agreement on the distracting sounds, head movement, and movement of the extremities. Clinician-speaker agreement on the Perception of Physical Tension Form also varied. The locations of eyes, lips, tongue, and vocal folds had higher levels of agreement than did other areas such as cheeks, throat, chest, and abdomen.

4.0 DISCUSSION

The primary purpose of this study was to explore the possibility of using self-reported measures for describing the perception of physical tension and to compare self-reports with more traditional clinician-based observations. Several common themes emerged when the participants who stuttered discussed their experience of physical tension. These included self-perception, perception of others, management, location of tension, degrees, and duration of tension. The clinicians' judgments showed little agreement with most participants who stutter on the SSI-4 Physical Concomitant Section. Participants who stutter and clinicians showed mixed agreement when using the Perception of Physical Tension Form, developed for this study. Agreement differed depending upon the location of physical tension. Higher agreement was seen for tension in the eyes, lips, and vocal folds; agreement was lower for locations such as the throat, abdomen and chest. This suggests that clinician and speaker perception of physical tension was improved using the Perception of Physical Tension Form. However, some locations of physical tension may only be experienced by speakers. This supports the use of speaker-self reports in the assessment of physical tension during stuttering.

4.1 INTERPRETATION OF QUALITATIVE DATA

The relatively limited number of themes discussed by participants who stutter implies that the experience of physical tension, though individualized, consists of a few common experiences. First, all participants discussed a limited number of locations where they experience physical tension during stuttering. Locations mentioned closely paralleled the locations reported by Snidecor (1955), supporting the idea that there are more commonly reported areas of physical tension which people who stutter experience. These include eyes, lips, tongue, cheeks, throat, vocal folds, chest, and abdomen. Participants who stutter reported these areas as more tense.

The subthemes of variability and change over time were found in many of the main themes discussed by participants who stutter. Frequency and degree of stuttering have been shown to vary from situation to situation and from day to day (Constantino, 2012). The present study supports the claim that speakers experiences' of physical tension varies and that these aspects change over time.

4.2 INTERPRETATION OF QUANTITATIVE DATA

It was hypothesized by the investigator that some locations of physical tension may not be observable, yet apparent to speakers. It was also hypothesized that the SSI-4 would overlook some clinically relevant physical tension. Data from the *Stuttering Severity Instrument* (SSI-4; Riley, 2009) and from the Perception of Physical Tension Form supported both of these hypotheses.

Locations of physical tension reported by speakers using the Perception of Physical Tension Form closely paralleled the locations reported by Snidecor (1955), adding external validity to the present study. Areas relating to the chest, abdomen, throat, and mouth were more commonly reported by speakers than were other areas. Certain locations of perceived tension reported frequently by speakers were reported less frequently clinicians (see Figure 11).

The perceived tension in the eyes, lips, tongue, and vocal folds had higher clinician-speaker agreement than did the areas of cheeks, throat, chest, and abdomen. It is possible that the areas of eyes, lips, and tongue have higher agreement because these areas often move during spoken speech and moments of stuttering. When a person stutters, their eyes may shut, their lips may purse, and their tongue may move abnormally or protrude. Tension in the area of the vocal folds may be associated with higher agreement because there may be an acoustic correlate to stuttered speech that observers may hear. In contrast, tension in areas such as the throat/larynx, chest, and abdomen may not be directly observable by the listener. This may explain why some areas of physical tension commonly reported by speakers during moments of stuttering may be unperceived by clinicians and other conversation partners.

A secondary purpose of this study was to ascertain whether the problems associated with observing physical tension were due to difficulties with validity or reliability. In other words, if clinicians were given a more specific tool for observing physical tension, would their observations more closely align with what speakers experience? Overall, agreement between clinicians on the physical concomitant section of the SSI-4 was poor. The distracting sounds, head movement, and movement of the extremities subsections showed little agreement between clinicians and speaker and between clinicians themselves. One exception is participant 8, whose stuttering was rated as the most severe by the SSI-4. Higher inter-clinician and clinician-speaker

agreement across subsections was found for this participant. It should be noted that both clinicians in this study were "expert" judges. Both are board-recognized specialists in fluency disorders (BRS-FD) with many years of experience working with people who stutter. The low levels of inter-clinician reliability and clinician-participant reliability suggest an underlying validity problem both with the SSI-4 physical concomitant section and observing physical tension in general. This study supports the use of speaker-self reports of physical tension during stuttering, perhaps culminating in a new method for measuring perceived physical tension during moments of stuttering that would more appropriately lead to better diagnostic and therapeutic outcomes.

Treatment of physical tension during moments of stuttering often involves building speaker awareness of where they experience tension so that they might change speaking patterns. Based largely on the work of Van Riper (1973), these approaches often involve freezing or holding in the moment to build awareness of locations and degrees of physical tension. Van Riper refers to this stage of therapy as identification, where the person who stutters is exploring what they *do* when they stutter rather than focusing on what their speech sounds like (Sheehan, 1951; Van Riper, 1973; Williams, 1957). Even though treatment of excess tension has often focused on *individual* location and degrees, assessment of tension has most often focused on general *overviews* of locations and degrees. The SSI-4 measures physical tension in terms the four physical concomitant sub-sections. It is not clear whether all clinically significant and speaker-perceived locations and degrees of tension can be assessed using the physical concomitant section of the SSI-4. This study supports the design of a new assessment based on speaker perceptions of specific locations and degrees of physical tension. Such new assessment

tool might grant better assessment outcomes that may more easily translate into therapy goals and objectives.

4.3 LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

Validity generally equates to truthfulness, which means that the validity of a measurement is "truthfulness or correctness or reality of a measurement" (Schiavetti et al., 2011, p. 188). In other words, a measurement is valid when it actually measures what it sets out to measure. Earlier it was discussed how observer-based assessments of stuttering behaviors lack supportive validity data. Even with the SSI-4, adequate validity measures of physical concomitants are lacking.

Perceptual definitions may introduce listener bias and offer a possible solution to why widely-used measurements that are based on perceptual definitions have been shown to be unreliable in studies (Hall et al., 1987; Ham, 1989). Ingham (1990) in response to Perkins (1990) and Moore and Perkins (1990) writes that "[By arguing for a speaker-defined definition of stuttering, they] may have only relocated the judgment reliability problem and, in doing so, raised as many validity problems as those generated by a listener-based definition of stuttering" (p. 394). Ingham's primary concern is whether or not a speaker can reliably self-report the loss of control. The point may be moot because what the speaker experiences are, in one sense, inherently valid by virtue of it being the actual experience of the speaker. If the speaker states that a loss of control exists, then it is safe to say that *something* happened, even if we do not yet understand what the specific nature of that loss of control might be. This is particularly true if the speaker judges the experience to be negatively affecting their speech and/or quality of life.

In other words, if the aim of an assessment is to get the opinion of a speaker, then the opinion of the speaker is automatically valid. This applies to the current study evaluating physical tension during moments of stuttering. Self-reported measures of physical tension are themselves valid in the sense that they are experienced and reported to have a negative impact on the speaker, thus affecting their participation in daily life activities.

However, threats to the validity of self-reports in this study may exist. The fact that all speakers who stutter were active NSA members may be a threat to external validity because this group of NSA members may not be representative of all people who stutter. These speakers regularly attend bi-monthly meetings of people who stutter, are knowledgeable about the disorder, and regularly discuss aspects of it with other people. Thus, the experience of physical tension may be different for these speakers than it may be for others.

The fact that all participants who stutter had a pre-existing relationship with the author may have affected what the speaker chose to disclose and discuss. Some people who stutter may have chosen to disclose and discuss more or less than this group did. This may affect how relatable these results are to other people who stutter. Lastly, this study focused on increased physical tension in adults. Future research may ascertain the degree to which the experience of physical tension of this group of speakers compares to other groups, including children.

Perceived effort while speaking at a higher volume directly corresponds with the amount of subglottic air pressure (Prosek, Montgomery, Walden, & Schwartz, 1979). However, rating speech effort during speech tasks is not without caveats, as differentiating cognitive speech effort and physical speech effort may be difficult for speakers if terms are not appropriately defined (Ingham et al., 2009). This may apply to the present study of physical tension. Speakers may

have difficulty differentiating between perceived tension and mental effort. The distinction between physical effort and mental effort is not inherently clear and worthy of further research.

This study focused on the perception of physical tension by speakers and clinicians. Moments of stuttering have long been experienced by speakers who stutter and perceptually observed to be accompanied by increased levels of physical tension (Shapiro, 1980). Yet, contradictory data have been found with EMG activity levels during moments of stuttering in particular muscle groups (see de Felicio et al., 2007; Denny & Smith, 1992; Smith et al., 1996; Smith et al., 1993). Future research may examine the degree to which muscle activity correlates with perceived tension and perceived effort, rather than stuttered speech. Doing so may provide a further comparison to which validity may be addressed. Instrumentation may have the benefit of removing clinician and speaker biases.

4.4 CONCLUSION

One purpose of this study was to explore the possibility of using self-reports of location and degree to assess the speaker's experience of physical tension. This study supported the research by Snidecor (1955). There are certain locations of physical tension in which groups of adults who stutter report experiencing physical tension more frequently than others. These include the eyes, lips, tongue, cheeks, throat, vocal folds, chest, and abdomen. This study also supported that these areas are reported as the most-tense (Snidecor, 1955). The thematic analysis showed that not only are speakers aware of locations and degrees of tension, but also that these locations and degrees are highly variable, may change over time, and are an important part of developing a speaker's self-perception.

A second purpose of this study was to compare these self-reports of location and degree to more traditional clinician-based observations. Analysis of data from the SSI-4 revealed relatively high agreement between both clinicians for total score and frequency sub-score yet poorer agreement for the duration sub-score. Inter-clinician and clinician-speaker agreement on the physical concomitant section were poor. Even though clinicians may show high agreement on the SSI-4 total score, individual sub-sections may differ greatly. This may lead to poor diagnostic and therapeutic outcomes.

The perception of physical tension form was created based on research by Snidecor (1955). Analysis of data revealed that some locations of physical tension have high inter-clinician and clinician-speaker agreement. These locations include the eyes, lips, tongue, and vocal folds. This suggests that perceived clinician-speaker agreement for some locations is possible given a different method for evaluation other than the SSI-4 physical concomitant section.

However, some locations listed in the perception of physical tension form had less inter-clinician and clinician-speaker agreement than the locations of the eyes, lips, tongue, and vocal folds. These locations are the cheeks throat, chest, and abdomen. This suggests that even with a new method of evaluation, some locations may not be perceptible by clinicians yet felt by speakers. Physical tension may be more accurately evaluated using speaker-based methods rather than more-traditional clinician-based observations. It is clear that physical tension warrants continued research because speakers commonly state it negatively impacts their quality of life and observers correlate increased tension to perceived severity. Future research may lead to more effective diagnostic and therapeutic outcomes, leading to better clinical services for this population.

APPENDIX A

CONVERSATION PROMPT

1. Please discuss in your own words your experience of physical tension during moments of stuttering.

APPENDIX B

PERCEPTION OF PHYSICAL TENSION FORM--ADAPTED FROM SNIDECOR(1955)

Name_____ Sample- Spontaneous Speech and Oral Reading

Location and Degree of Physical Tension during Stuttering

	Least						Most
Eyes	1	2	3	4	5	6	7
Lips	1	2	3	4	5	6	7
Tongue	1	2	3	4	5	6	7
Cheeks	1	2	3	4	5	6	7
Throat	1	2	3	4	5	6	7
Vocal Folds	1	2	3	4	5	6	7
Chest	1	2	3	4	5	6	7
Abdomen	1	2	3	4	5	6	7
Other-							
_____	1	2	3	4	5	6	7
_____	1	2	3	4	5	6	7
_____	1	2	3	4	5	6	7
_____	1	2	3	4	5	6	7
_____	1	2	3	4	5	6	7

APPENDIX C

SELECTED PASSAGES FROM THE SSI-4

Reading, Adult Level (228 Syllables) Plate XI

Washington—Part of the nation's future oil supply may lie within some extraordinary organisms that have been called a "third form of life." A Colorado State University microbiologist reports obtaining pure hydrocarbon that could be converted to gasoline or lubricating oils from several of the organisms. The oily substance is "energy-rich, definitely a lubricant, combustible, and isn't soluble in water," says the researcher, Thomas Tornabene. And the oil is free of air-polluting sulfur. The discovery now is only a laboratory phenomenon; any commercial application is some time away. "Right now we are concentrating on the organisms' basic mechanisms," Tornabene says. "We have two genetic engineers looking at them to find ways of getting them to grow faster and to pump oil faster."

Adapted from, G.D. (2009). *SSI-4: Stuttering Severity Instrument.* Austin, TX: PRO-ED

Reading, Adult Level (160 Syllables) Plate XII

The Great Chief in Washington sends word that he wishes to buy our land… How can you buy or sell the sky—the warmth of the land? The idea is strange. We do not own the freshness of the air or the sparkle of the water. How can you buy them from us? We will decide in our time. Every part of this earth is sacred to my people. Every shining pine needle, every sandy shore, every mist in the dark woods, every clearing, and every humming insect is holy in the memory and experience of my people… For all things share the same breath—the beasts, the trees, the man… All things are connected. Whatever befalls the earth befalls the sons of the earth.

Adapted from, G.D. (2009). *SSI-4: Stuttering Severity Instrument.* Austin, TX: PRO-ED

Reading, Adult Level (369 Syllables) Plate XIII

So here we are in Friuli, tucked away in a remote corner of the Alpine foothills in northeastern Italy, at a little restaurant. I have to admit that when I travel, history is not the first thing on my mind. Food and wine are. And that's what sold me on Friuli. It is famous as a source of some of Italy's best white wines. We went primarily in search of wines, unaware that we soon would make a culinary detour.

Occupying the extreme northeast corner of Italy, Friuli's scenery ranges from rugged coastline along the eastern border to placid plains in the west and the majestic Alps in the north, where Italy butts up against Austria. Directly to the south is Venice, just a little more than an hour and a half away.

Though off the beaten tourist track, Friuli is hard in the path of history. Standing at one of the major crossroads between Western Europe and the East, it was conquered by just about everyone who passed by. As a result, things look different here. Rather than the familiar cultural overlay of most of Italy, the central European influence is readily apparent in Friuli. The architecture tends more toward Austrian grandeur than Tuscan simplicity. Here you'll find gray stone castles rather than sun-drenched villas. The people look different, too, taller and blonder than southern Italians, and with plenty of German and Central European surnames.

Adapted from, G.D. (2009). *SSI-4: Stuttering Severity Instrument.* Austin, TX: PRO-ED

Reading, Adult Level (378 Syllables) Plate XIV

The talk over salad and fromage was about ghosts. My English friend Christopher Neville informed me that two of them haunt his house in southern France, on the sunny terrace of which we were now having lunch. I don't normally believe in spirits, but it seemed wise to suspend disbelief for the moment, since I would soon be entering a region of sorcery and hidden Grails, where heretics once marched defiantly into the bonfires of bloodthirsty crusaders: the land of the Cathars. Christopher's ghosts arrived one day because he had taken an unusually keen interest in the Cathars. I do know that his knowledge proved invaluable.

The Cathars, I had read, were a kind of gentle people. They were dualists (man is bad, the spirit good), they viewed the material world as corrupt, and they rejected certain important tenets of the powerful Catholic Church, including priests, the Trinity and the sacraments. The laying on of hands was thought to transform believers into the "Perfects" or Good Christians, who were from then on expected to abstain from sex and meat. The popularity of this gnostic faith threatened the reign of Pope Innocent III. In 1208, he sent Simon de Montfort on a crusade against the heretics. The crusade took its name from the town of Albi and was followed 25 years later by the Inquisition.

Adapted from, G.D. (2009). *SSI-4: Stuttering Severity Instrument.* Austin, TX: PRO-ED

APPENDIX D

INSTRUCTIONS TO PARTICIPANTS WHO STUTTER

Read:

Many people who stutter experience physical tension during moments of stuttering. This study will compare how your experience of physical tension during moments of stuttering compares to what clinicians observe.

You will be videotaped speaking in three situations. Upon completion of the first two samples, you will evaluate the location and degree of physical tension that you feel in your body using two tools. The video is just a reminder. Please also use your own feelings of awareness to complete these forms from what you remember. The first is the physical concomitant section from the Stuttering Severity Instrument-4 (SSI-4), and the second is the perception of physical tension form. **(Give both to the participant to look at.)**

The SSI-4 evaluates physical tension in four areas: Distracting sounds, facial grimaces, head movements, and movements of the extremities. Each section is ranked from not distracting at all to very severe and painful looking.

Distracting Sounds – "This category includes any non-speech sounds that accompany the stuttering. For example, the examinee may continually clear his or her throat or may

swallow. Other common sounds include noisy breathing, whistling noises, sniffling, blowing, and clicking sounds."

Facial Grimaces- "Any abnormal movement or tension about the face counts in this category. Examples of abnormal facial behaviors are pressing the lips together tightly, pursing the lips, tensing jaw muscles, blinking the eyes or partially closing the eyes, having the tongue protrude, and jerking the jaw. "

Head Movements- "Head movements generally consist of turning the head away from the listener to avoid eye contact, looking down at the feet, scanning the room, or looking at the ceiling.

Movements of the Extremities- "Any general body movement such as shifting in the chair counts in this category. Other common movements include specific movement of a limb, such as foot-tapping or swinging, excessive movement of the hands about the face, fidgeting with something in the hand, or swinging an arm."

The second tool is the Perception of physical tension form. Possible locations of physical tension are listed on the left hand side. If there are other locations that you feel physically tense, please list them in the spaces provided. The degree of tension should be marked using the 7 pt. scale, 1 being the least and 7 being the most. If you feel no tension, please leave that field blank. Do you have any questions?

First Sample:

Say "For this first sample I'm going to record syllables to measure the length of it. I'm not recording your stuttering". Turn video on, show participant number.

Prompt “please tell me about your job”

Possible follow-up questions-

- “what was that like?
- “where was that?”
- “Did you enjoy it?”

Second Sample:

Randomly select paragraph XI, XII, XIII, or XIV of the *Stuttering Severity Instrument-Fourth Edition* (SSI-4; Riley, 2009). Give to participant. Please read this.

“Please watch the video and rate yourself using the SSI-4 physical concomitant section”

“Please watch the video and rate yourself using the Perception of Physical Tension Form”.

Third Sample:

This sample will not be given for clinicians for evaluation. The purpose of this conversation is to discuss your experience of physical tension as a person who stutters.

Prompt: **“Please tell me about your experience of physical tension during stuttering**”

Possible follow-ups:

“Do you feel like some locations and degrees are more common for you than others?”

“Please tell me your thoughts about rating yourself using the two forms.

- In your own words, what is the experience of physical tension like?
- How long does it seem to last?
- Does physical tension change?

- Is it same all the time?
- What do you think other people see when you are experiencing tension?
- Is there anything you can do to reduce the tension?

APPENDIX E

DEMOGRAPHIC QUESTIONAIRE AND SCREENER

Participant: _____Age:_____Gender: M F

1. Do you consider yourself a person who stutters? **Y N**

2. At about what age did you first start stuttering? _____

3. Other than stuttering, do you currently have another speech disorder, language disorder, hearing disorder, physiological or neurological disorder? **Y N**

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