THE IMPACT OF BOTULINUM TOXIN INJECTIONS IN ADDUCTOR SPASMODIC DYSPHONIA:

A CROSS SECTIONAL AND LONGITUDINAL STUDY

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ABSTRACT

This cross-sectional and longitudinal study focuses on (a) the impact of botulinum toxin injections on patients with adductor spasmodic dysphonia; (b) the psychosocial changes resulting from botulinum toxin injections over an eight month period, during which the patients underwent two injections; and (c) the influence of psychosocial factors on outcome. The study also examines a group of subjects with functional dysphonia, which was initially intended as a comparative group.

The Voice Disability Questionnaire (VDQ) used in this study to assess disability associated with voice impairment consisted of five components: 'social isolation', 'negative communication', 'public avoidance', 'limited understanding' and 'communication difficulty'. Disability, as measures by the VDQ, showed fluctuation in relation to intervention.

Five components were derived from the Voice Impairment Coping Questionnaire. These were: 'physical avoidance', 'information seeking', 'social comparison/distraction', 'finding new meaning' and 'religion/wishful thinking'. The study confirms the role of coping as a mediator between disease process and outcome. Other variables examined over time were anxiety, self-esteem, depression, health locus of control, social support, expectations and satisfaction..

Prediction of voice disability following first and second botulinum toxin injections suggested that improvement can be reliably predicted from coping, health locus of control, age and marital status, measured one week to three months earlier. Prediction of psychological well-being suggested that coping, voice disability and health locus of control can predict changes in depression, anxiety and self-esteem following intervention.

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CHAPTER 1 REVIEW OF THE LITERATURE

Spasmodic dysphonia is a relatively rare voice disorder characterised by strained/strangled phonation that can severely disturb one's ability to communicate. It affects people from both a communication and a socio-economic standpoint. A significant number of patients with spasmodic dysphonia report withdrawal from social settings due to communication difficulties e.g. speaking with intermittent voice breaks, reduced loudness, and increased effort (Murry et al., 1996). Patients also report job changes or even retirement, as well as reduced social interaction in general. This could explain why early descriptions of spasmodic dysphonia often characterised the patient as nervous, withdrawn and tense, whereas more recent studies of patients suggested that, although anxiety and depression levels may be elevated in as many as 50% of those with spasmodic dysphonia, the emotional changes are the result of, rather than the basis for, the disorder.

The need for further investigations of both the symptoms and the causes of spasmodic dysphonia prompted Aronson et al. in 1968 to evaluate patients with spasmodic dysphonia in detail. Aronson consequently described "variations in the symptom complex" and identified the following types within the general group of spasmodic dysphonia (Aronson 1980):

- Adductor spasmodic dysphonia
- Abductor spasmodic dysphonia
- Mixed type
- Essential voice tremor

The adductor type, according to Aronson, results from irregular hyperadduction of the vocal folds and is characterised by jerky or choppy breaks in phonation, staccato-like catches, strained strangled harsh voice and monopitch. Sounds are usually jerky and effortful and are often associated with laryngeal discomfort due to strain (Rosenfield, 1988; Aminoff et al.,1978; Aronson & Hartman, 1981). Abductor spasmodic dysphonia is characterised by a breathy, effortful voice quality, with sudden interruption in voicing that results in aphonic whispered segments of speech. This condition is associated with inappropriate abduction of the vocal folds (Aronson, 1985; Aronson & Hartman, 1981). Mixed spasmodic dysphonia will involve a variety of symptoms, resulting from inappropriate adduction and/or abduction (Aronson, 1985; Aronson & Hartman, 1981).

The high incidence of tremor in patients with spasmodic dysphonia (58% Aronson et al. 1968b; 40% Izdebski 1981), suggests that perhaps a proportion of patients diagnosed with spasmodic dysphonia present in fact with essential tremor. Considerable controversy exists, however, as to whether essential tremor is a separate or related disorder (Aronson & Hartman, 1981).

1.1 SPASMODIC DYSPHONIA- DESCRIPTION AND AETIOLOGY

The aetiology of spasmodic dysphonia is unclear (Salamy and Sessions,1980;Aronson, 1985). Some authors have advocated a psychological origin (Arnold, 1959; Heaver, 1959; Bloch, 1965; Brodnitz, 1976; Henschen and Burton, 1978), whereas others have implicated a neurological origin (Robe et al. 1960; Aronson et al., 1968a, 1968b; Aminoff et al.,1978; Schaefer, 1983).

The condition was first described by Traube in 1871 as a "spastic form of psychogenic hoarseness" (Traube,1871). Traube based his diagnosis on one young female patient, assuming a hysterical aetiology. In 1895, Schnitzler postulated an organic aetiology based on two patients with "cramping of the vocal cords and forced voice" who were noted to have kinesis of facial muscles and abnormal arm and leg movements. He called this entity "aphonia spastica" or spastic dysphonia.

Theories on the psychogenic origin of spasmodic dysphonia were reinforced by Gerhardt (1880) who labelled the disease "funktioweller larynxkrampf", and Coen (1886) who observed spastic phonation with normal laryngoscopic findings and attributed this form of phonation to hysteria. In 1939 Berendes analysed 23 case histories and suggested specific psychiatric considerations for the analysis of phonatory descriptions of spasmodic dysphonia. In the same year, Critchley (1939) described three patients with this disorder;

two of the patients had organic aetiologies for their disorder, and the third case was of psychiatric origin. Critchley described the clonic head and neck movements as part of an underlying neurologic disease, contrary to the prevailing psychiatric school of thought. He even suggested that earlier cases described had cerebellar or basal ganglion pathology.

1.1.1 Psychogenic theory

Despite Critchley's report, most researchers for the next three decades regarded spasmodic dysphonia as a psychogenic disorder of the "pneumophonic co-ordination". Two main types were identified , one resulting from emotion or trauma and the other from occupation. The traumatic form was believed to follow a severe psychic event, leaving a previously normal speaker with bizarre vocal behaviour. The occupational form affected people who were described as professional voice users such as lawyers, public speakers or teachers. In 1959 Arnold developed the psychogenic viewpoint and suggested that "this voice disorder represented an intrusion of subcortical primitive mechanism of phonation after regular cortical phonatory system has become inhibited by unconscious withdrawal of a shattered personality from the threats of daily life" (Arnold, 1959). He attributed the various head and neck movements, pains and occasional breathing difficulties to primary evidence of a psychogenic disorder and recommended a psychiatric and "ortophonic" re--education.

1.1.2 Neurogenic (organic) theory

In 1960 Robe et al. published the results of an electroencephalographic (EEG) study of two males and eight females with spasmodic dysphonia of 6 months to 15 years duration. In all patients indirect laryngoscopic examination was normal. Fifty percent associated onset with flu, cold or upper respiratory tract infection. Forty percent had a positive history of a neurologic disease in the family. Eighty three percent had pyramidal tract signs and 6% had cranial nerve findings. On EEG, 9 patients had abnormal findings localised in the temporoparietal region. These findings led the authors to conclude that spasmodic dysphonia is a symptom of a central nervous system disease that might arise in some cases on a postencephalic basis. These findings started questioning the concept that all cases of spasmodic dysphonia were due to psychiatric disturbance.

Aronson et al. (1968) described neurologic signs in 20 out of 27 patients, which included voice tremor, facial and tongue twitches and torticollis. Additional support of a neurological basis for spasmodic dysphonia was provided by several investigators using acoustic, perceptual and family history (Aminoff et al., 1978; Aronson & Hartman, 1981).

The case for an organic basis was strengthened when Dedo (1976) produced a dramatic improvement in the voice of spasmodic dysphonia patients by transecting the recurrent laryngeal nerve. Although the voice did not return to normal in all cases, the success of a surgical procedure in treating this condition suggested an organic rather than a psychogenic basis. Additional support for a neurological basis of the disorder was provided by Schaffer (1983) who performed three independent evaluations of brainstem functions on patients with spasmodic dysphonia and on a normal control group matched by age and sex. Schaffer found statistically significant differences between the two groups. Furthermore, he found a significant correlation between severity of central nervous system impairment and vocal tremor, number of associated neurogenic signs , and illness duration. Schaffer concluded that spasmodic dysphonia appeared to be a spasmodic brainstem disorder.

Blitzer et al. (1985) have suggested that spasmodic dysphonia should be considered a focal dystonia. Dystonia is a general term referring to a group of isolated neurologic signs or syndromes and is caused by lesions of the extrapyramidal system. Adductor spasmodic dysphonia can be regarded as focal laryngeal dystonia or as one component of a more generalised dystonia (Blitzer et al. 1985). These observations were based on an electromyographic study of sixteen patients with spasmodic dysphonia who demonstrated normal spontaneous activity and increased activity on phonation. Blitzer et al. (1985) claimed that in spastic diseases, there is usually an irregularity of muscle action potential which was not observed in patients with spasmodic dysphonia. They concluded that spasmodic dysphonia is a type of dystonia specific to the larynx. Based on this assumption, Blitzer et al. (1988) proposed an effective form of treatment of spasmodic dysphonia in the form of botulinum toxin (Botox) injections.

Summary

Earlier studies that have been reviewed clearly suggest that initially the aetiology of spasmodic dysphonia was felt to be entirely psychogenic. This was primarily due to the discrepancy between the abnormal speaking voice and the normal appearance of the larynx, as well as the high incidence of emotionally stressful events, e.g. marital problems or job loss, associated with the time of onset. However, this theory has been challenged by treatment with psychotherapy, hypnosis, and tranquillising drugs which have been consistently unsuccessful. Conversely, the neurological aetiology of spasmodic dysphonia has been supported by a sizeable body of evidence of associated neurological signs in these patients (Aronson et al. 1968a) and documented evidence of abnormal findings in various tests of brain functions (Robe et al. 1960; Dordain and Dordain, 1972; Sharbrough et al., 1975; Aminoff et al., 1978; Finitzo-Hieber et al.,1982). The prevailing opinion today is that the vast majority of patients with spasmodic dysphonia have a medical disease: a focal dystonia of the larynx. The term dystonia refers to a syndrome of sustained muscle contractions. Dystonic movements are aggravated or manifest during voluntary movement, and get worse with fatigue, physical or emotional stress (Murry et al., 1996). The pathophysiology of spasmodic dysphonia is not known.

1.2 ADDUCTOR SPASMODIC DYSPHONIA (ASD) - DEFINITION

This study focuses on adductor spasmodic dysphonia. This is a type of spasmodic dysphonia characterised by intermittent excessive closing of the vocal folds during vowel sounds in speech. Patients with this condition have intermittent strained hoarseness and uncontrolled voice breaks or changes in pitch during vowels in speech. Hyperadduction of the vocal folds interferes with airflow through the folds, stopping vocal fold vibration, resulting in voice breaks. The speech is characterised by intermittent hoarseness as well. In the most severe form, patients present with constant strained hoarseness and reduced volume, as very little air can be forced through the vocal folds. The speech is excessively slow, tight and effortful. Singing is usually affected less than speaking. Coughing and laughing are not affected.

1.3 INCIDENCE

The incidence of adductor spasmodic dysphonia in the general population is unknown. Early studies reported that adductor spasmodic dysphonia was a relatively rare voice disorder (Aronson, 1990), however, recent reports in the literature would suggest that it is not a rare disorder, but one that is not frequently diagnosed and reported (Murry and Woodson, 1996). This may be due to the fairly recent availability of methods both for the evaluation and treatment of this disorder. A possible explanation for the limited availability of data on frequency of occurrence of adductor spasmodic dysphonia is clinicians' failure to identify the disorder and the fact that until recent years patients have been identified almost exclusively on the basis of the sound of their voices. Spasmodic dysphonia seems to occur equally in men and women (Aronson et al., 1968a), although in most studies, the disorder affects more females than males. Reported male to female ratios range from 1: 1 (Miller & Woodson, 1991) to 1: 8 (Aronson, 1985).

1.4 ONSET AND COURSE

Adductor spasmodic dysphonia is usually idiopathic and its onset is typically in the fourth or fifth decades, although a range from teenage years to the seventies is reported (Colton & Casper, 1990). Adductor spasmodic dysphonia is usually manifested as a non specific hoarseness that is intermittent and fluctuates in severity, frequently during either occupational or emotional stress, following a period of excessive or strained voice use.

Many patients note that the symptoms first become apparent during stress and occur only in speech. Over one to two years the symptoms progress and most often the severity and consistency increase, with gradual development of adductor laryngospasms. The disorder may then plateau or continue to worsen until phonation is too effortful and barely possible. This is a chronic disorder, remaining stable during the initial development of symptoms.

Aronson (1979) found in a study of 100 patients, that it takes approximately one year for spasmodic dysphonia to develop into its peak. Although the progression of symptoms may be rapid or may take place over a number of years (Colton & Casper, 1990). Few cases of spontaneous remission have been reported. Furthermore, it has been suggested that patients who show spontaneous recovery, might have a psychogenic disorder .

1.5 DIAGNOSTIC ISSUES

1.5.1 Laryngoscopic signs

In vocal fold movement disorders, diagnosis depends on observing the vocal folds during speech. Laryngological examination in patients with adductor spasmodic dysphonia usually reveals normal vocal folds. It is therefore essential to put patients through vocal tasks to allow observations for hyperadduction of the vocal folds which may result in only slight opening of the posterior commisure, false vocal fold closure, narrowing of the anteroposterior dimension of the glottis or complete apposition of the arytenoids against the petiole of the epiglottis. Rhythmic oscillations of the vocal folds can sometimes be observed, suggesting associated vocal tremor.

1.5.2 Differential diagnosis

Difficulties with differential diagnosis pose a dilemma in selecting patients for Botox intervention, as this treatment could possibly have long term detrimental effect on the laryngeal muscles (Ludlow et al., 1994). Patients with adductor spasmodic dysphonia may have other focal dystonias in addition to their laryngeal symptoms, such as torticollis, suggesting a neurological disorder. However, the absence of these symptoms does not preclude adductor spasmodic dysphonia. The difficulty in making a differential diagnosis arises because symptoms that characterise adductor spasmodic dysphonia such as hoarseness, effortful voice production or pitch breaks on vowels, can be also characteristic of other voice disorders, such as muscular tension (functional) dysphonia. Muscular tension dysphonia is a hyperfunctional voice disorder that responds positively to voice therapy focusing on relaxation, breathing exercises, improved voicing techniques and changes in lifestyle. Many patients with severe adductor spasmodic dysphonia can present with severe hyperadduction similar to muscular tension dysphonia and vice versa.

The puzzling characteristics of spasmodic dysphonia have often led professionals to label these psychogenic disorders. Similar speech symptoms can occur in patients with psychogenic dysphonia (Aronson et al., 1966; Elias et al., 1989; Hartman et al., 1989; Aronson, 1990; Cannito, 1991). No objective tests are available for distinguishing between psychogenic and neurogenic form of the disorder (Ludlow, 1994). Only when the patient has spontaneous and long-standing complete remission of symptoms, can the psychogenic origin of the disorder be confirmed. A psychosocial interview and a trial period of voice therapy are therefore needed to rule out the existence of a psychological component in such patients. Furthermore, it is recommended that the diagnosis of adductor spasmodic dysphonia is obtained by a team including an otolaryngologist, a speech & language therapist and a neurologist.

1.5.3 Diagnostic assessment of voice disorders

Voice evaluation includes a history of the voice disorder, including details of previous voice problems, the onset and the current disorder and its course, as well as events associated with the onset (Aronson, 1980). Information is obtained on the patient's lifestyle, health, social history, work and stress factors (Colton & Casper, 1990). Recording is made of the patient's voice in a variety of vocal tasks. Rating scales are used to quantify clinician's impression. Respiration, phonation, pitch and resonance are also assessed.

Recent advances in technology have resulted in improved accuracy and objectivity, and information about the action of the vocal folds can be obtained without the need for invasive procedures. Techniques such as video laryngoscopy can provide accessible information and documentation to the patient and health professionals (Metson & Rach, 1992). Electro-laryngography (Abberton et al., 1989; Baken, 1992) gives information about the action of the vocal folds, using non invasive procedures.

1.5.3.1 Fibreoptic video naso-endoscopy

Fibreoptic video naso-endoscopy is the preferred method for examining vocal fold abnormalities in adductor spasmodic dysphonia, because movement can be observed during speech with this technique. The symmetry, range, speed and vocal fold adduction (closing) and abduction (opening) during non speech tasks is essential to rule out peripheral nerve injury.

1.5.3.2 Objective measures

A wide range of objective measures are currently available for the assessment of voice disorders. However, although the strained and strangled voice which characterises adductor spasmodic dysphonia is easily recognised by clinicians, the same vocal characteristics can be associated with other neurogenic disorders such as Parkinson's disease, Huntington's disease and tremor (Aronson & Hartman, 1981). This makes some measures insufficiently specific to separate spasmodic dysphonia from other voice disorders, hence they cannot be regarded as diagnostic techniques, but as indicators of function (Woodson et al.,1992). This further illustrates the need for functional disability ratings that can be used in the assessment of adductor spasmodic dysphonia. The following are objective measures used for assessment of voice disorders:

1.5.3.2.1 Acoustic analysis

The acoustic analysis of voice production permits a quantitative analysis of the multidimensional physical characteristics of the voice signal and an inference about the underlying physiological mechanism. Acoustic characteristics of the normal voice are age and sex-dependent. The analysis is done during sustained phonation tasks and during continuous speech (Baken, 1987; Fritzell & Fant, 1986).

1.5.3.2.2 Aerodynamics

Measures of airflow, air pressure, and air volume reflect laryngeal valving efficiency and respiratory support (Bless, 1988). These parameters change as a function of opening and closing patterns of the vocal folds and as a function of respiratory support.

1.5.3.2.3 Perceptual assessment of voice quality

Various protocols have been developed for detailed description of voice quality features. The Laver Vocal Profile Analysis (Laver, 1980; Laver, 1991) includes perceptual parameters corresponding to long-term postural settings within the phonatory, articulatory and resonance systems. The Buffalo III Voice Profile (Wilson, 1987) is another example of a profile used by speech and language therapists for rating major aspects of voice . Simultaneous acoustic, laryngoscopic or electrolaryngographic measures may be used to confirm the nature of phonatory events that correspond to perceptual judgements of pitch, loudness, rate-duration, and quality. Speech and language therapists are trained to apply a common operational definition to each term, and high inter-listener reliability scores are sought for severity judgements.

1.6 INTERVENTION

1.6.1 Current intervention for adductor spasmodic dysphonia

The treatment of adductor spasmodic dysphonia has included a variety of approaches in an attempt to modify the voice and improve communication. These included voice therapy, counselling, hypnotherapy, biofeedback, medication and surgery (Freeman et al., 1985).

1.6.1.1 Psychiatric/psychological intervention

Given the historical model of spasmodic dysphonia as a psychiatric disorder, it is not surprising that almost all patients were at one time or another referred to a psychologist or psychiatrist. According to Freeman et al. (1985), patients differed markedly in their attitudes and responses to such treatment. Some sought help with the objective that it would alleviate their voice problem. Others sought psychological or psychiatric counselling to help them cope with the effect of spasmodic dysphonia on their lives, e.g. for anxiety and/or depression.

The reports on the efficacy of these treatments are mixed. On one hand, this form of intervention failed to alter or alleviate the voice problem. On the other hand, individuals found stress management techniques, progressive relaxation and biofeedback helpful towards helping them cope, accept and manage their vocal handicap (Freeman et al.,1985).

1.6.1.2 Surgical treatment

In the first half of the 20th century a number of surgeons proposed a variety of surgical treatments in an attempt to improve their understanding of spasmodic dysphonia and its symptoms. Rethi (1952) proposed anaesthetising regions of the larynx to determine which muscles might be transected to alleviate laryngeal spasms. Jackson (1959) suggested surgical removal of "central and symmetrical cuneus in both ventricular bands" in cases of spasmodic dysphonia. These surgical procedures were of little therapeutic value but they helped discover that both intrinsic laryngeal pathology and systemic disease can produce spasmodic dysphonia-like symptoms.

Dedo first performed unilateral section of the recurrent laryngeal nerve for spasmodic dysphonia in 1976 (Dedo, 1976). The procedure and various modifications have been carried out by many laryngologists. The immediate post-surgical results have been reported to be highly successful (Dedo, 1976; Dedo et al.,1977; Barton, 1979; Wilson et al., 1980; Dedo & Izdebski, 1981), but the long-term results appear to be conflicting and the procedure has been abandoned by most surgeons due to return of symptoms in time, despite continuous paralysis of the vocal fold (Wilson et al., 1980; Aronson & DeSanto, 1983; Fritzell et al., 1982; Aronson & DeSanto, 1983; Chevri-Muller et al., 1987).

1.6.1.3 Pharmacological treatment (including botulinum toxin injections)

A variety of medications including tranquillisers, muscle relaxants, antihistamines and antacids have been prescribed for patients with spasmodic dysphonia. Drug therapy has not been found to be useful in the long term management of spasmodic dysphonia (Inagi et al., 1996; Freeman et al.,1985).

The most encouraging treatment to date for patients with spasmodic dysphonia is botulinum toxin (Botox) injections. This intervention was first carried out by Blitzer et al. (1986). Botulinum toxin is injected into the thyroarytenoid muscle complex using electromyographic localisation, causing the effect of chemical denervation. Voice improvement and fluency are reported to last for approximately three months post injection, with little or no side effects (Blitzer et al. 1988).

Initial studies demonstrated that high doses of Botox could be injected to both thyroarytenoid and cricothyroid muscles to produce unilateral paresis, resulting in adequate symptom control for three to four months (Miller et al.,1987; Ludlow et al., 1988). Since 1988, the efficacy of small dosage bilateral injections has been reported (Brin et al.,1989; Blitzer et al., 1988; Truong et al.,1991). Ludlow et al. (1992) suggested that bilateral Botox injections lasted longer in male and unilateral injections longer in female patients. These findings were further supported by Maloney and Morrison (1994). Recent studies suggested that unilateral injections to the thyroarytenoid muscle were more effective, longer lasting (Adams et al., 1993), and resulted in less post injection breathiness than bilateral injections (Zwirner et al., 1993).

1.6.1.4 Voice therapy

Most organic voice disorders are treated medically and surgically. Additionally, patients receive voice therapy. Functional voice disorders are generally treated with voice therapy only. The aims of voice therapy are to correct faulty functions, to compensate for deficit and to modify the care and use of the vocal mechanism (Enderby, 1995). A variety of techniques can be used in the treatment of voice disorders. Relaxation is applied to reduce musculoskeletal tension in the laryngeal area (Aronson, 1980). Breathing exercises are employed to optimise breath support for the voice. Various phonation exercises are used to promote soft initiation of vocalisation, rather than hard glottal attack. Attention is paid to pitch, volume and rate of speech, to ensure that these are used appropriately.

Reports of voice therapy for the treatment of spasmodic dysphonia date back to 1971 (Boone, 1971). The general consensus has been that patients may achieve temporary improvement under limited speaking situations during treatment, but little or no carryover is obtained (Bloch et al., 1965). No objective documentation to establish the efficacy of voice therapy as a single treatment in spasmodic dysphonia is available. Freeman et al. (1985) summarised a number of techniques that have been reported to be helpful in improving voice quality in adductor spasmodic dysphonia. These included relaxation, breath support and control, maintenance of subglottal air pressure and glottal airflow (breathy speech), alteration of pitch, tone focus, reduction of vocal intensity, modification of speaking rate, changes in prosody and vocal hygiene (Freeman et al.,1985; Boone, 1971; Block et al., 1985). These techniques have been reported useful when used in speaking situations by patients, although there is no indication that they actually reduce voice breaks or improve the patient's ability to communicate (Murry & Woodson, 1995).

1.7 THE PSYCHOLOGY OF VOICE DISORDERS

Voice disorders refer to changes in laryngeal function which result in inappropriate quality, pitch or loudness. They are classified as organic or non-organic. Organic disorders are generally associated with disease or injury and can be congenital. They include acquired hyperfunctional disorders where voice misuse or abuse results in laryngeal changes, such as vocal nodules or inflammation. Non-organic voice disorders are generally caused by stress and tension and unaccompanied laryngeal pathology. They include functional/muscle tension dysphonia. Aronson (1980) prefers the term psychogenic to the term "functional". He states : "a psychogenic voice disorder is broadly synonymous with a functional one but has the advantage of stating positively, based on an exploration of its cause, that the voice disorder is a manifestation of one or more types of psychogenic disequilibrium- such as anxiety, depression, conversion reaction, or personality disorder- which interfere with normal volitional control over phonation" (p.131). Monday (1983) divides functional (psychogenic) voice disorders into two categories- functional dysphonia, where there is no organic lesion in the larynx, and functionallaryngopathology,where vocal abuse may lead to lesions.

It is acknowledged that "functional" may refer to an action or a process that may be operational in either organic or psychogenic voice disorders, in that it can represent a continuum which is non-organic in origin, but becomes organic as a result of complex physiological actions involving muscular activities. Examples of this include secondary laryngitis and vocal nodules. However, for the purposes of this thesis, the term "functional" is used in relation to a non organic voice disorder.

Research indicates that most voice disorders have a certain psychological component and can result in alteration in personal identity and self esteem (Aronson, 1990) . It therefore seems surprising that most studies on spasmodic dysphonia have focused only on the aetiology of the disorder and the intervention, rather than on the psychological and social aspects of this condition (Cannito, 1991). Furthermore, the studies published were written mostly by health professionals and otolaryngologists representing how they perceive the impact of the condition on their patients. What has been lacking from this traditional model, is the means of understanding the experiences of those who have spasmodic dysphonia (Engel, 1977).

1.8 THE IMPACT OF VOICE DISORDERS

In reviewing the earlier literature on the impact of voice disorders, it emerged that voice and speech were treated, in the field of otolaryngology in particular, as one subject under the heading of speech (Sataloff, 1997). Therefore, it seems important to distinguish between these two aspects of communication. Voice refers to production of sound of a given quality, whereas speech refers to the shaping of sounds into intelligible words. Voice quality is the continuous background to speech production which involves a complex physiological and anatomical system (Wirz and Beck, 1995). This thesis focuses on the consequences of a voice disorder.

In looking at the impact of a voice disorder, it is valuable to consider the World Health Organisation's definition of impairment, disability and handicap (WHO, 1980). According to these definitions, impairment is concerned with the acute loss or damage resulting from biomechanical changes in the system, in this case dysphonia. Disability reflects the effect or consequence of an impairment in terms of the person's ability to perform an activity within the normal range, in the context of this study, lack of intelligibility, for example. Handicap is concerned with the limitations in functional performance of the individual, as a result of impairment and/or disability e.g. limitations fulfilling a role socially or at work. This definition clearly makes a distinction between physical status (impairment), physical functioning (disability) and social functioning (handicap). However, most health status measures incorporate aspects of all three of these areas, some fail to clearly distinguish between them (Bowling, 1995).

Quality of life is increasingly considered an important parameter for evaluating the severity of medical conditions and treatment outcome (Bowling, 1995; Hollister & Weintraub, 1993). This issue has been the focus of a range of studies across a variety of medical conditions such as Parkinson's disease, cancer, rheumatoid arthritis, asthma and HIV infections (Fitzsimmons & Bunting, 1993; Haberman et al., 1993; Tope et al., 1993; Bendtsen & Hornquist, 1993; Lang, 1993). Surprisingly, little is known about the impact of speech disorders, and voice disorders in particular, on quality of life. Some authors postulated that the reason for that is that such disorders might be anticipated to produce negligible effect because they are usually not life threatening (Smith et al., 1993).

However, because of the particular relevance of communication, it may be expected that work, social and psychological aspects of people's lives would be affected.

Most diagnostic measures for voice disorders, used within the clinical setting, are measures of impairment, designed for differential diagnosis and identification of specific deficits. A large number of measures of functional ability or disability have been developed (Bowling, 1995). Among the measures most commonly used as generic health status measures are the Sickness Impact Profile (SIP) (Bergner et al., 1981), and the Nottingham Health Profile (McEwen, 1993). However, few of these measures can be used in the field of speech and language therapy, as they are not sufficient or detailed enough to assess the disability resulting from disorders of communication, which affects patients' life style, their family and social life, and their employment. Wade (1992) has reviewed measures of health related quality of life commonly used by researchers among people with multiple sclerosis, Parkinson's disease, head injury and other neurological conditions. However, these were mainly concerned with physical and mental functioning, aphasia and speech, rather than the effects of the condition on the broader aspects of life and social interaction. Oxenham et al., (1995) examined the perceptions of speech and language therapists and spouses of aphasic patients, by asking them to make judgements about the extent of disability and handicap, experienced by aphasic speakers in their daily life. Clinicians based their judgements on assessment procedures and spouses based their analyses on their aphasic partner's day-to-day communication. Results indicated that both clinicians and spouses used terms related to disability and handicap to describe aphasics' communication problems, although they did not describe the same aspects of disability. Clinicians generally agreed in their perception of handicap related to 'understanding' of language, but were less reliable in rating the handicap resulting from 'speaking'. Results suggest that whilst current assessments provide information about impairment and disability resulting from aphasia, they do not provide sufficient information that would enable clinicians to predict the effect of aphasia on patients' daily life. One study has attempted to assess the effect of voice problems on quality of life. Smith et al.(1993) set about developing a questionnaire to assess disability in patients with voice disorders. Their self- administered lifestyle questionnaire includes information about the functional impact of voice problems in various domains (e.g. work, social interactions), current occupation and work related changes resulting from the symptoms, as well as psychological and emotional aspects such as self esteem.

More recently, Jacobson et al. (1997) developed the Voice Handicap Index (VHI) a 30-item questionnaire, with the aim of measuring the psychosocial handicapping effects of voice disorders. The VHI consists of three subscales that provide information on the functional, physical and emotional aspects of voice disorders. It can be used to assess the patient's judgement about the relative impact of his or her voice disorder upon daily activities, as well as an outcome measure.

1.9 PSYCHOLOGICAL WELL-BEING (DEPRESSION, ANXIETY, SELF-ESTEEM)

It is increasingly recognised that voice disorders in general, including spasmodic dysphonia, may have pervasive effects upon the individual's life, beyond the vocal impairment (Morrison & Rammage, 1994). One aspect of the consequences of disease on daily life is emotional well-being. This section considers the impact of voice disorders on psychological well-being and the ways in which various measures attempt to assess this impact.

A number of issues emerge from the review of the impact of voice disorders on psychological well-being: conceptual issues as to the definition of psychological well-being, and the manner of its assessment. Conceptually, psychological well-being is looked at in a number of different ways. One characteristic way is to classify people into those with a clinical condition (i.e. in need of treatment) such as clinical depression or clinical anxiety. In general, the use of self-administered questionnaires is not considered adequate for diagnosing clinical depression or anxiety (Rodin, 1991; McDowell & Newell, 1996). Despite this, in most studies, the preferred method of assessment of psychological well-being has been self-report measures (Creed, 1990; DeVellis, 1993). An alternative approach, and one which is more suited for the general understanding of the fluctuations in mood in patients with a physical illness passing through treatment, is to consider levels of mood. In this approach, self-administered questionnaires are used to analyse levels of mood and the questionnaire is treated as a continuous measure. Consequently, the focus of interest includes variations in mood states which are not abnormal, through to those requiring treatment. In addition, this approach lends itself for a consideration of positive mood states such as self-esteem. The discussion below will consider both these approaches.

The major focus of research on psychological well-being in dysphonia has been on depression. Within this research, absence of depression has been equated with positive well-being (Wallston & DeVellis, 1991). This approach raised a question with regards to the exact definition of positive well-being (Newman et al., 1996). Consequently, some alternative approaches have been developed, incorporating other psychological dimensions such as self-esteem .

Mild depression appears to be common in dysphonic patients (Aronson, 1990). However, it is not yet clear whether the dysphonia comes first, leading to psychological distress or whether psychological distress results in the voice disorder (Scott et al., 1997). In the case of spasmodic dysphonia, depression is described in the literature as one of the psychosocial effects of the condition. Aronson (1979) found that 64% of spasmodic dysphonia patients reported depression after developing the condition.

Anxiety has been examined in some studies in relation to psychological well-being and intervention, surgical and medical intervention in particular (Anderson & Masur, 1983; Gil, 1984; Johnston, 1984; Kendall & Watson, 1981; Mathews & Ridgeway, 1984). These studies concluded that surgery seems to be a stressful experience for the majority of people, as assessed by self-report measures of anxiety. In most studies the decline in anxiety has been found after the procedure, although the time over which anxiety drops appears related to the knowledge of the outcome of the procedure. To account for individual differences in the reduction of anxiety after surgery, Janis (1958) suggested that moderate pre-operative anxiety, which would encourage the "work of worry", would facilitate post-operative recovery by reducing anxiety. This early model of surgical stress, however, has not been supported. Spielberger (1973) and others (Auerbach, 1973; Johnson et al., 1971; Kendall & Watson, 1981; Martinez-Urrutia, 1975; Wallace, 1986) have found support for a linear, positive relationship between pre and post operative measures of anxiety.

The literature on voice disorders reveals that excessive anxiety is the most common psychological feature in voice disorders in general (Aronson, 1990; Butcher et al., 1993). The literature also raises an interesting issue concerning the effect of intervention on anxiety in patients with voice disorders; whilst it is reported that the majority of patients respond well to intervention, which should in theory resolve their anxiety as well as the vocal symptoms, some 5-10% do not show improvement (Brodnitz, 1969; Koufman & Blalock, 1982) and report continuing presence of anxiety. The explanation offered by some authors to this issue is that patients have possibly adjusted to their anxiety (Aronson, 1990) and the voice disorder similarly, has become habitual (Boone, 1991). Thus, they fail to respond to intervention.

Several authors have reported elevated anxiety and depression levels in individuals with adductor spasmodic dysphonia (Murry et al., 1996; Greene & Mathieson, 1989; Butcher et al., 1993). Greene & Mathieson rightly state: 'psychological disturbance, such as anxiety and depression, is only to be expected from a crippling and occupational handicap' (1989, p. 268). Cannito et al. (1994) examined the attitudes of patients with adductor spasmodic dysphonia towards communication, before and after Botox injections. They used various instruments e.g. Erickson Scale of Communication Attitudes (ESCA), (Andrews & Cutler, 1974), as well as a self reported measure of anxiety (State-Trait Anxiety Inventory-STAI) (Spielberger et al., 1983). Their results showed that prior to Botox intervention, the majority of their subjects with adductor spasmodic dysphonia reported high levels of anxiety. One week following treatment, although communication attitudes improved considerably, they still had higher self report anxiety than a matched normal control group.

Murry et al. (1994) reported that following successful treatment of adductor spasmodic dysphonia with Botox, patients who were clinically anxious or depressed showed a significant reduction in both measures. Patients that exhibited mild depression had a reduction in state anxiety (the anxiety associated with a particular state such as talking) one week following Botox, and a subsequent reduction of the strained, strangled voice quality. The authors concluded that although continued study of the emotional effects of spasmodic dysphonia is warranted, it is clear that reduction of symptoms in a vast majority of patients influences their psychological well-being.

Self-esteem is another dimension of psychological well-being which can be affected by dysphonia, especially if the voice has been one of the main sources of self-esteem in the person's life (e.g. in the case of professional voice users) (Rosen & Sataloff, 1997). Surprisingly, however, this aspect has not been commented on in voice research to date. A measure of self-esteem (Rosenberg, 1965) has been included in this study as an additional dimension in the assessment of psychological well-being.

To date, most studies into psychological well-being of patients with voice disorders have yielded contradictory results (Scott et al., 1997). This may be largely due to the fact that these studies have used a variety of psychometric measures. It is important to recognise that the impact of adductor spasmodic dysphonia is a process that is likely to change over time, as is the case in most chronic illnesses (Cassileth et al., 1984). Some studies on chronic illness have indicated that the impact of impairment on psychological well-being is mediated through a number of psychological and social factors. Notable amongst these are coping responses and social support (Newman, 1996). The mediating role of these factors is investigated in this study.

1.10 COPING

A number of factors have been suggested as intervening between illness and its impact e.g. coping, social support and health locus of control. These will be discussed in the following sections.

Coping is a key concept in psychological medicine (Ray et al., 1982) and tends to refer to the ways in which people try to deal with the stress of illness. It includes both behavioural and psychological mechanisms (Newman et al., 1996; Leventhal et al., 1984; Taylor, 1982). It is a process not a goal (Krohne, 1986), and the general aim of coping actions is to reduce imbalances between demands by stressors and capacities of the individual.

1.10.1 Conceptualisations of coping

Conceptualisations of coping can be categorised according to their assumptions of the primary determinants of coping responses. Dispositional approaches assume that stable person-based factors underline the selection of coping behaviours (Carver et al., 1989; Endler & Parker, 1990). Conversely, contextual approaches assume that transitory situation-based factors determine people's choices of coping responses. Common to these conceptualisations is the measurement of coping by indexing thoughts and actions reported by individuals in coping with stressful situations (Feifel & Stack, 1989; Carver et al., 1989). Both dispositional and contextual approaches have complementary strengths in describing the coping process. Dispositional approaches assess generalised, preferred coping styles (Epstein & Meier, 1989). Contextual approaches demonstrate how an individual copes with a particular type of stressful event, reflecting changes in coping efforts during a stressful episode (Carver et al., 1989; Folkman, 1992).

1.10.2 Classification and appropriateness of coping

Coping can generally be classified according to the method of coping and the focus of coping. The first approach emphasises the method of coping people employ, whereas the alternative approach emphasises the focus of coping: a person's orientation and activity in response to a stressor.

According to Billings and Moos (1981), coping methods can fall into three categories: active-cognitive which refers to cognitive attempts made by the individual to manage the appraisal of a stressful event through positive comparisons between present and past predicaments; active-behavioural which refers to behavioural attempts made by the individual to deal directly with the stressful event and, avoidant which refers to the individual's attempts to adopt avoidance methods of coping, e.g. denial and withdrawal (Holmes & Stevenson, 1990).

According to Schonfeld (1990), focus of coping can take three possible forms: it can be directed at modifying the meaning of the stressors, modifying the actual stressors or managing distress (Schonfeld, 1990). A common distinction is made between problem-focused strategies aimed at directly solving the problem, and emotion-focused strategies aimed at dealing with emotional distress generated by the problem through controlling emotions or discharging them (Lazarus & Folkman, 1984).

Recent literature on illness indicates that successful coping involves an active approach, including tackling issues, seeking information, solving problems and seeking social support; unsuccessful coping implies a passive, withdrawn attitude, often with self-accusation or resignation (Heim, 1991). Certain strategies may be effective throughout the entire illness process and other strategies may only be effective at a given illness stage (Heim, 1993). It is unclear at this stage of the research whether some patients do best with a relatively narrow repertoire of coping modes, while others may do best when they apply a large set of coping modes over time.

1.10.3 Coping over time

The evidence in the literature regarding the change in coping strategies over time is not conclusive. Research on coping with chronic conditions e.g. rheumatoid arthritis suggests that, in general, as the disease progresses, individuals appear to use a wide range of coping strategies, but no particular strategy is used to an extreme. It is thought that with time and experience, individuals tend to fall into a more passive coping pattern, or that they become more flexible in their coping repertoire (Parker et al., 1988; Newman et al., 1990; Newman et al., 1996). Some individuals may rely on the same coping repertoire over time, despite changes in disability (Newman et al., 1996).

On the assumption that coping may change over time, a relevant issue is the time interval that should be used in assessing coping. This is of particular importance when examining how the individual copes with a chronic stressor. In order to obtain a representative picture of coping over time in relation to intervention, assessments need to be designed to capture changes in disability e.g. before and after intervention (Stone and Neale, 1984).

The ability of individuals to change their coping behaviour in response to situational demands has been viewed by some researchers as leading to a more successful adaptation and better outcome. Some evidence related to coping with chronic conditions indicates that over time, individuals become more flexible in their coping in that it is not dominated by a particular strategy (Revenson and Felton, 1989). However, other researchers found that a greater number of coping strategies was related to poorer adjustment, as patients were still looking for an effective coping strategy to deal with their chronic condition (Felton et al., 1984).

1.10.4 The Lazarus and Folkman stress-coping model

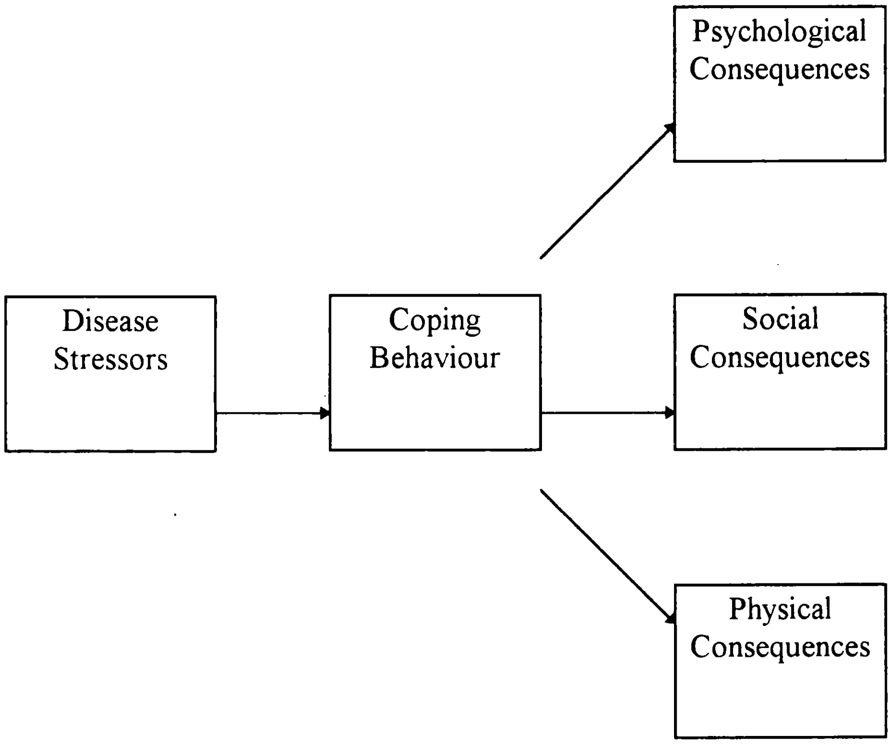
One of the most widely used contextually orientated models of coping is the stress appraisal-based model of Lazarus and Folkman (Folkman, 1992; Lazarus, 1981; Lazarus & Folkmam, 1984). According to this model, coping is viewed as a response to specific stressful situations rather than a stable feature of personality, where cognitive appraisals of potential threat function as a mediating link between life stressors and the individual's coping response. External demands refer to the event itself, whereas internal demands refer to the emotional reactions to the event. Consequently, problem-focused coping represents responses directed at the external event, and emotion-focused coping represents emotional reactions. Coping is seen as a process rather than an event, during which thoughts and actions directed at the stressor may coincide or alternate, and give rise to emotional and behavioural consequences. Each response may produce effects that require further coping e.g. medical treatment may produce side effects that require further treatment, in addition to having an intended effect on the disease and/or the individual's emotions. The way people cope with each aspect of chronic disease will have psychological , social and physical consequences that will affect outcome.

The moderating relationship between all three stages of the coping process- the primary appraisal, the secondary appraisal and the actual coping strategy subsequently adopted, would seem to suggest that certain personalities will consistently be predisposed to adopt more effective coping methods than others ; e.g. individuals who exhibit type A behaviour pattern are likely to display a bias for action and consequently adopt problem solving behaviour in the form of information seeking (Friedman & Rosenman, 1987). It is not clear, however, whether personality factors have a direct effect on coping. Carver et al. (1989) have pointed out that the impact of personality characteristics on coping is modest and that coping preferences exist independent of personality factors. However, personality characteristics may influence coping indirectly through their impact on appraisal and it could be argued that only longitudinal research can demonstrate such relationship.

The relationship between coping efforts and psychological well-being has received considerable attention in the literature, with some degree of agreement regarding the implicit nature and direction of the relationship. Coping is commonly thought to mediate between stressful events and such psychological outcomes as depression (Endler & Parker, 1990).

Lazarus and Folkman's (1984) model of coping has been used as the basis of this study. Thus, coping is viewed as a mediator between specific disease related stressors and several outcomes (Figure 1.1). The model is based on Lazarus's (1991) recent insights, but also on the work of others (Maes et al., 1996).

Figure 1.1. Basic outline of Lazarus's model for coping.



1.10.5 Coping measurement

One of the most frequently used self-report, situation specific questionnaires is Folkman and Lazarus' Ways of Coping Scale (1980), but others have been developed with similar formats (e.g. Billings & Moos, 1981; Carver et al., 1989; Endler & Parker, 1990; Pearlin & Schooler, 1978). No specific coping questionnaire has been developed for use with voice disorders.

1.10.6 Coping with language, speech and voice disorders

On the basis of research of other chronic diseases, it seems likely that psychosocial effects would be felt by individuals who have a chronic disease as they attempt to cope and adjust to a changed body image or to a permanent disability (Kaplan et al., 1983; Holahan et al., 1984). Studies of patients who survive with cancer or permanent physical impairment indicate that there are major adjustments associated with lifestyle, related to social and family life, which are driven by patients' coping ability (Krause, 1986; Cohen & Wills, 1985). Parr (1994) investigated the ways in which aphasics cope with mild aphasia. She argued that systematic investigation of coping is a necessary precursor to functional therapy, as particular styles and strategies may not combine well with goals without this understanding. Her research demonstrated the need for a longitudinal study of the way people with aphasia cope with their condition over time.

Review of the relevant literature has revealed very little with regard to how people cope with voice disorders (Rosen & Sataloff, 1997). The literature in speech-language pathology focuses on the effect of emotions on voice rather than on the effect of vocal impairment on emotions, and the role of coping (Aronson, 1990; Brodnitz, 1976; Aronson, 1979). Bury (1991: p.462) comments that 'language and communication are major ingredients in adaptation'. It seems plausible that how people cope may affect the outcome of intervention, particularly in the case of spasmodic dysphonia. Adductor spasmodic dysphonia is a non progressive condition but the intensity of symptoms varies considerably. The earlier diagnostic stages of the condition are difficult for patients and their families because although they are initially relieved to have a confirmed diagnosis, they must come to terms with the meaning of the condition for the patient's life, leading to a readjustment of prior patterns of social, vocational and family interaction. A more specific task of coping with spasmodic dysphonia includes, where appropriate, adjustment to Botox intervention whereby some disability may be removed for a period, but symptoms return when the effect of the injection wears off.

1.11 SOCIAL SUPPORT

1.11.1 Definition and theory

Social support refers to a range of interpersonal exchanges that provide an individual with information, emotional reassurance, material assistance and a sense of self-esteem (Newman et al., 1996). Pierce et al. (1996) have described three interconnected conceptualisations of social support:

a. Perceived social support, defined as the perception that others are available and desire to provide support (Pierce et al., 1990).
b. Supportive relationships, defined as the resources that may aid in coping.
c. Supportive networks, defined as the individual's supportive relationships.

Social support has been viewed as an important moderator of the relationship between stress and illness (Newman, 1996). Studies of people with chronic illness demonstrated the benefits of social support to psychological adjustment to illness and mental health (DiMatteo & Hayes, 1981; Kaplan & Toshima, 1990; Kennedy et al., 1991; Wortman & Conway, 1985). Social support is viewed by some researchers as a stable characteristic which varies between individuals, and others consider it to be a behavioural response to a particular stressor (Newman et al. 1996). Researchers differentiate between a structural (e.g. marital status), and a functional (e.g. providing advice) approach to social support. They postulate that support transactions can occur only if there is a network of people who are both able and willing to provide support (Antonucci, 1985). During the course of life, the 'core' of support providers remains the same, with different individuals filling different support needs (Weiss, 1976).

A number of models have been developed concerning the mechanism underlying the beneficial effects of social relationships:

1. The direct effect model: according to this model, support is beneficial for all individuals, regardless of the presence of stress or the degree of stress experienced (Cohen & Wills, 1985).

2. The stress-buffering model: social support is only beneficial under stress (Cohen & Willis, 1985). According to this model, social support exhibits its greatest benefit during times of stress, by enhancing the individual's coping efforts (Throits, 1986).

3. The matching hypothesis: according to this theory, certain types of social support are beneficial when they fit the contextual features of the stressor (Cohen, 1988; Curtona & Russell, 1990). This theory highlights the possibility that social support may have a different effect for different illness-related stressors at different times of the course of illness.

4. Social support as coping assistance: according to this approach, support is the actions of others to assist an individual in his/her coping strategies (Lazarus & Folkman, 1984; Thoits, 1986). Thoits (1986) suggested that problem focused coping and instrumental support aim at managing the stressor, whilst emotion focused coping and emotional support are directed at reducing the distress generated by the illness.

When defined in terms of coping response, social support refers to the receipt of supportive behaviours from others in the individual's network. Evidence suggests that the availability of social support, as well as its receipt, may influence coping as well as the outcome of coping efforts (Pierce, 1990).

1.11.2 Measurement of social support

Various social support measures have been developed (Bruhn & Philips, 1984; House & Kahn, 1985; Tardy, 1985). Instruments tend to assess functional aspects of support received versus perceived availability, or satisfaction with support. Ideally, the measure used should provide information regarding the support provided, the extent of support provided and the availability of support networkers (O'Reilly, 1988).

1.11.3 Social support and voice disorders

Only a few studies have examined the benefits of social support among patients with voice disorders. Social support from family and friends has been implicated as a critical factor in the successful adjustment of laryngectomy patients (Pruyn et al., 1986; Richardson et al., 1985). Recent research suggests that support from partners is related to positive rehabilitation outcomes for laryngectomy patients which affects acquisition of speech (Richardson & Bourque, 1985), decrease in depression and anxiety (Shapiro & Kornfeld, 1987), and increased social functioning (Richardson, 1981). Despite the emphasis on social support in rehabilitation research, no studies have been carried out to examine this dimension and its interaction with coping and outcome in adductor spasmodic dysphonia.

1.12 HEALTH LOCUS OF CONTROL

The concept of locus of control has emerged from social learning theory which is concerned with the way individuals make choices from a variety of potential behaviours available to them. Locus of control is based on the concepts of reinforcement and reward and is generally defined as the degree to which a person perceives a causal relationship between his behaviour and reward (Rotter, 1966; Lefcourt, 1966). Locus of control is not a static trait but there is evidence of a significant relationship between personality and locus of control. Furthermore, it has been shown to vary in terms of degree between individuals, as well as within individuals in different situations. Health locus of control refers to general beliefs held by individuals about their health and what they are able to do in order to influence the course of health and illness. Internal health locus of control (IHLC) is the extent to which the individual believes they have an influence over their future health and illness. Chance health locus of control (CHLC) is the extent to which the individual believes that fate and chance will determine future health and illness. Powerful others (POHLOC) is the belief that others, such as health care professionals, influence one's future health and illness. Cross sectional research showed that high scores of internal health locus of control led to higher levels of psychological well- being (Wallston, 1983).

Tennen et al. (1992) showed that when beliefs about control were contradicted by reality, individuals became depressed. Some studies distinguished between control over treatment and control over symptoms (Newman , 1996).

Perceived competence and self efficacy describe individuals' beliefs that they have the skills to deal efficiently with issues related to their health. This concept could prove to be an important predictor of outcome in voice disorders interventions.

1.13 EXPECTATIONS

The review of the literature has shown that the term 'expectations' has been invoked to explain differences in response to health care (Fitzpatrick et al., 1984). To that end, expectations refer either to hopes and desires for what ideally should happen or to guesses and predictions of what is likely to happen. In the current study, patients were asked about their expectations in relation to outcome of intervention, in this case Botox injection.

Research generally links positive expectations with positive physical outcomes in various populations such as college students (Scheier & Carver, 1985), heart surgery patients (Scheier et al., 1989), alcoholics (Strack et al., 1987) and various patient groups who demonstrated placebo effect in clinical drug trials (Taylor, 1989). It has been hypothesised that the expectations for therapeutic gain held by patients are linked to the actual clinical improvement shown by the patients after treatment (Martin et al., 1977). In addition, it has been hypothesised that the link between expectations and improvement is causative (Goldstein, 1962; Wilkins, 1973). Although some studies have demonstrated a link between expectations and treatment outcome (using both subjective and objective measures) (Martin et al., 1977), several studies have failed to demonstrate an impact of patients' expectations on treatment outcome (Martin et al., 1977). This resulted in an alternative interpretation of the nature of patients' expectations (Martin et al., 1975; Wilkins, 1973) which suggests that patients' expectations may predict, but not directly cause, improvement . This notion was supported by a number of researchers in the field of clinical psychology (Martin et al., 1973; Wilkins, 1973).

Conversely, some have speculated that positive expectations may contribute to negative outcomes for some people (Tennen & Affleck, 1987). They expressed concern that optimistic beliefs may lead to psychological distress for individuals who later face negative experiences and to poor coping in those who need to recognise unpleasant realities in order to take appropriate action (Leedham et al.,1995). Studies have, however, confirmed that patients' self-reported positive expectations are generally associated with good mood, adjustment to the illness, and good quality of life, even in patients who experienced health setbacks (Leedham et al., 1995).

Expectations have been shown in some studies, to be heavily influenced by experience (Fitzpatrick et al., 1984). This aspect is of particular interest in the case of spasmodic dysphonia where most patients undergo multiple Botox injections. Thus, their experience of one injection may influence their expectations of subsequent injections. Furthermore, patients with spasmodic dysphonia demonstrate considerable variability in post-injection ratings of voice quality and phonatory effort across repeated time intervals, following multiple Botox injections (Cannito et al., 1994). This further illustrates the need to investigate the relationship between expectations and outcome in this patient group. Measurement of patients' expectations is described in the Method section (3.2.10).

1.14 PATIENT SATISFACTION

Patient satisfaction reflects the individual's degree of satisfaction with his or her health status and outcome and of fulfilment of expectations of the treatment. Research has linked the communication styles of physicians and health care practitioners to patients' satisfaction with health care (Buller, 1987). Patient's satisfaction has emerged as an important determinant of adherence (Korsch et al., 1968; Lane, 1983) and appears to be partly the result of the physician's communication while interacting with the patient. Ben-Sira (1976,1980) proposed a social interaction model in which patients rely heavily on the physician's model of communication when evaluating the quality of care delivered. According to this model, when the physician's communication was more satisfying, patients felt more satisfied with the care. Buller et al.(1987) identified four characteristics that affected the contribution of the physician's communication style to the patient's evaluation of health care. They included :the severity of patient's illness (communication style was less important to more severely ill patients); patient's gender (communication style was less important to females), patient's age (communication style was more important to older patients); physician's speciality (communication style was more important when patients saw family practitioners as opposed to specialists); frequency of visits (communication style was more important to patients who see physicians less frequently).

Patient satisfaction is an important outcome of medical care. It may also be a critical contributor to the decision of adhering to a prescribed treatment, or even to continue medical care (Newman et al., 1996). It is of particular interest in the case of spasmodic dysphonia as patients have to make a decision to adhere to the prescribed treatment of Botox injections on a regular basis. No research to date has investigated this issue in relation to spasmodic dysphonia and its treatment.

1.15 THE STUDY

Spasmodic dysphonia has been described as a highly debilitating and complex voice disorder (Murry 1994). Objective description and assessment of spasmodic dysphonia are quite difficult (Woodson et al. ,1992). Moreover, physical and emotional difficulties experienced by the patients in attempting to communicate, which have direct impact on outcome, have received little attention to date.

The symptoms of spasmodic dysphonia respond to medical intervention in the form of botulinum toxin (Botox) injections which provide a temporary relief from the disabling symptoms. Various studies suggested that, following successful treatment of spasmodic dysphonia with botulinum toxin, patients who were clinically anxious or depressed showed a significant reduction in both measures one week following the injection and subsequent reduction of the strained , strangled voice quality (Murry et al., 1994). However, the chronically disabling nature of the condition and the temporary effect of the intervention have not been investigated. There is therefore a need for a longitudinal study of the psychosocial effect of spasmodic dysphonia and the effect of repeated intervention on these aspects. This study aims to address this need.

1.15.1 Aim of the study

This thesis is based on a longitudinal study of 40 patients with adductor spasmodic dysphonia (ASD) who attended the voice clinic at the Middlesex Hospital, London. In addition, an examination was made of a potential voice disordered comparison group of 40 individuals with functional dysphonia (FD).

The primary objectives of the present study were (1) to investigate the short and long term impact of Botox injections on patients with adductor spasmodic dysphonia; (2) to examine voice disability and psychological well-being over time, and to evaluate their impact on outcome; (3) to evaluate the extent to which intervention outcome can be accurately predicted, and; (4) to compare the psycho-social correlates of voice disability in patients with adductor spasmodic dysphonia to patients with a functional voice disorder.

The study was carried out across eight assessments for the spasmodic dysphonia group, during which the subjects underwent two Botox injections. For the functional dysphonia group, analysis was conducted based on five assessments, during which the subjects underwent a course of voice therapy.

CHAPTER 2 METHODS

2.1.SUBJECTS

2.1.1 Selection criteria

The subjects for the study were drawn from voice clinic referrals in one hospital. They consisted of 40 patients with adductor spasmodic dysphonia (ASD) and a comparison group of 40 patients with functional dysphonia (FD). The subjects were selected to the groups in the study on the basis of the following criteria:-

2.1.1.1 Inclusion criteria ASD group

Patients who were included in this group had intermittent glottal closure spasms during speech, without evidence of laryngeal tremor or constant overadduction (Morrison et al., 1986; Morrison et al., 1994). None had symptoms or a history suggestive of a psychogenic dysphonia, periods or situations when the patient was symptom free, any history of laryngeal trauma or other speech or movement disorders, or neurological abnormalities.

1. Patients were examined by a team which included an otolaryngologist and a speech & language therapist. They were evaluated with a standard case history and physical examination including direct fibreoptic laryngostroboscopy with video recording. Patients were put through specific vocal tasks to permit observation for hyperadduction, tremor, inappropriate abduction, and spasmodic disruption of phonation.

2. Patients were evaluated by a neurologist in order to exclude associated neurological conditions such as extrapyramidal disorders.

3. Patients underwent laryngeal electromyography (EMG) which revealed elevated levels of activity in the thyroarytenoid muscles, during phonation as well as during breathing (Ludlow et al.,1990).

2.1.1.2 Exclusion criteria ASD group

1. Patients with abductor spasmodic dysphonia were excluded.

2. Patients with paralysis or structural lesions of the vocal folds seen at the laryngoscopic examination were excluded.

2.1.1.3 Inclusion and exclusion criteria FD group

Only patients who presented with dysphonia, in the absence of organic laryngeal pathology were included in this group. These patients have been evaluated by a team which included an otolaryngologist and a speech & language therapist, using a standard case history and physical examination, including direct video-laryngostroboscopy. Patients with anatomic lesions or inflammations e.g. vocal nodules, were excluded.

2.2 ASSESSMENT METHODS

2.2.1 Voice disability

Voice disability was assessed by means of the Voice Disability Questionnaire (VDQ) (see Appendix 1). The questionnaire, developed for the purpose of this study, was designed with the intention to shift assessment domains from the general areas of verbal expression or intelligibility to social aspects of communication, and to measure how specific voice disorders affect daily life interactions in different settings. This measure was not intended to replace but to supplement more traditional diagnostic measures of impairment designed for differential diagnosis and identification of specific deficits. It was designed to measure functional ability as well as the effect of dysphonia on social roles and interaction, and could therefore compliment other measures of disability/handicap devised to assess the psychological and vocational effect of an impairment or disability.

The Voice Disability Questionnaire was developed as a disorder-specific measure following interviews with patients, observations and consultations with health professionals, and a review of the literature. The items that were generated cover domains that are of potential relevance to disorders of communication in general and spasmodic dysphonia in particular, e.g. occupation, family and social interaction. The questionnaire comprises twenty eight questions and is divided into three sections; communication, work and social interaction. Each question is rated on a 5 point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). A total score is obtained, which reflects the level of disability resulting from a voice disorder. The higher the score, the greater the disability. The analysis of the VDQ is described in detail in the Results section.

2.2.2 Perceptual ratings of voice impairment

Perceptual assessment of voice quality were obtained by independent ratings of two speech and language therapists, using the Buffalo III Voice Profile (Wilson 1987). This profile is commonly used for rating twelve major aspects of voice: laryngeal tone (breathy, harsh), pitch, loudness, nasal resonance, oral resonance, breath supply, muscle tension (hypertense, hypotense), vocal abuse, rate, speech anxiety, speech intelligibility and overall voice rating. A five point rating scale is used, with 1 being normal and 5 being very severe deviation. The present study focuses on the rating of three aspects of voice which are of particular relevance to spasmodic dysphonia: muscle hypertense, laryngeal tone breathy and overall voice. Each subject in the spasmodic dysphonia group was videotaped while performing an identical task on two occasions, prior to and one week after the injection. These were rated by two speech and language therapists who were otherwise not involved in the clinical intervention of the patients, in an attempt to avoid bias.

2.2.3 Depression assessment

The Beck Depression Inventory (BDI) was used to assess depression (Beck et al. 1961). The scale consists of twenty one items which stress cognitive symptoms of depression, each with four response choices in the form of statements, ranked in order of severity. The subject selects the response that best fits the way he/she has been feeling during 'the past week, including today'. The items were scored with a maximum total of 63 for a measure of depressed mood. Clinical depression levels were derived from categories described in the manual: normal (0-9), mild depression (10-15), mild/moderate (16-19), moderate/severe (20-29), severe (>29). The BDI has good psychometric properties in that it has high validity and reliability (Bowling, 1995).

2.2.4 Anxiety

The Spielberger State Trait Anxiety Inventory (Spielberger 1983) was used to assess anxiety. The questionnaire consists of forty self report items, twenty items for measuring state and twenty items for measuring trait anxiety. State anxiety was used in this study to assess changes in transitory anxiety across visits. Each item is rated on a four point scale. The determination of clinical anxiety was derived from a cut-off score described in the manual. This was derived from a sample of general medical and surgical patients, and was any score above 42.3. The scale has been shown to be strong in terms of validity and reliability (Bowling, 1995).

2.2.5 Self-esteem

Self-esteem was assessed by means of the Rosenberg's Self-Esteem Scale (Rosenberg 1965). The measure consists of ten items with responses reported along a five-point

Likert Scale ranging from 'strongly agree' to 'strongly disagree'. Half the items are expressions of positive self-esteem and half are associated with negative self-esteem. The responses are scored from 1 to 5 (strongly agree to strongly disagree). Low scores indicate high self-esteem. Levels of self-esteem of a normal population, both males and females, are described in the manual as having a mean of 34.7 (sd 4.8). Although some authors claim that the scale requires further testing for validity, reliability and sensitivity to change (Bowling, 1991), its reliability and validity have been generally shown to be good (Rosenberg, 1965).

2.2.6 Coping

It was considered necessary to develop a disease specific measure as general coping scales, such as the Ways of Coping scale (Folkman and Lazarus, 1980), are not appropriate or sufficiently sensitive to evaluate the coping process adopted by people with a voice disability. Coping was therefore assessed by means of the Voice Impairment Coping Questionnaire which was devised in order to evaluate coping in subjects with communication disorders (Appendix 2). This questionnaire was developed with the aim of eliciting how individuals cope in relation to their voice problem, seen in the case of spasmodic dysphonia as a chronic stressor. This was based on the Lazarus and Folkman's (1984) model of coping. Within this model, the stimulus for coping is the stressor faced by the individual. Appraisal variables include the individual's judgement of the threat posed by the stressor and the available options for its management.

The Voice Impairment Coping Questionnaire is a self report measure and it comprises twenty seven items that are of particular relevance to communication. The response format is Likert type, ranging from 1 to 6. The analysis of the questionnaire is described in further detail in the Results section.

2.2.7 Social support

The Interview Schedule for Social Interaction (ISSI) (Henderson et al. 1980) was used to assess availability and adequacy of people in specific roles in the subjects' lives. The questionnaire comprises fifty two questions and is based on the theory that social relations depend on attachment, social integration, nurturance, reassurance of personal worth, sense of reliability and help and guidance. Scoring is based on four indices:

AVAT: assesses the availability of affectionate close relationship (attachment) and has a range of scores from 0 to 8 (high).

ADAT: assesses the perceived adequacy of and the satisfaction with close relationships and has a range from 0 to 12 (high).

AVSI: assesses the availability of more diffuse relationships, as with friends, work colleagues and acquaintances, and has a range of scores from 0 to 16 (high).

ADSI: the perceived adequacy of these diffuse relationships and has a range of scores from 0 to 17 (high).

The ISSI has the advantage that aspects of reliability and validity have been assessed both in healthy adults and in the field of chronic disability (Fitzpatrick et al., 1991). It has been found to have strong reliability and validity (Henderson, 1981).

2.2.8 Health locus of control

In order to determine individuals' cognition about control over their health, the Multidimensional Health Locus of Control questionnaire (Wallston et al. 1976, 1978) was administered. The scale contains eighteen items which use a six point Likert scale for response, ranging from 'strongly disagree' (1) to 'strongly agree' (6). The items reflect three dimensions of health locus of control beliefs: Internal (health is determined by one's own behaviour), Chance (health is determined by luck or fate), and Powerful Others (health is determined by factors over which a person has little control).

The items are summed for each category and scores for each dimension of belief range from 6 to 36. Few studies support the construct validity of the scale (Winefield, 1982), however, more data exists on its reliability which has been found to be high (Bowling, 1995).

2.2.9 Expectations

Patients' expectations of treatment outcome were assessed using a 7-point analogue scale devised by the author. 1 signified no improvement and 7, great improvement (Appendix 3).

2.2.10 Satisfaction

The Medical Interview Satisfaction Scale (MISS) (Wolf et al. 1978) was used to assess subject satisfaction with the medical encounter. The scale consists of 26 items which measure satisfaction with three aspects of medical encounters: the affective aspect or the extent to which the subject feels the doctor listens, understands and is interested; the behavioural aspect or the patient's evaluation of the doctor's competence during the course of consultation; the cognitive aspect or satisfaction with the quality and amount of information provided by the doctor. The questionnaire is self-administered. Each item is rated on a five-point scale of agreement, from 1 to 5, and the summed scores are divided by the number of items answered by the subject to give a total score ranging from 1 ('extremely low satisfaction') to 5 ('extremely high satisfaction'). Although further research is needed to assess its clinical validity (Ware et al., 1988), the MISS is generally considered to have an internally consistent reliability.

2.2.11 Statistical Methods

The Statistical Package for the Social Sciences (SPSS), version 6.1, was used for all statistical analysis with the exception of the ANOVA's, where Stat View was used.

The primary probability level accepted as significant in this study is $p < 0.01$ for all Chi-square, t-tests and ANOVA. Where a post hoc test was performed following a significant analysis of variance, a level of $p < 0.05$ was accepted as significant.

2.2.11.1 Correlations

Correlations were examined by means of the Pearson product moment correlation tests. These were performed to examine relationship between variables, and to determine factors for inclusion in the multiple regression analysis. Significance level for inclusion in the multiple regression was taken as $p < 0.05$ in order not to exclude any variables that may have contributed to the dependent measure in the multiple regression analysis.

2.2.11.2 Principle Component Analysis

Principle components analysis (PCA) is a method of deriving the underlying dimensions which represent linear combinations of the original variables. In this study, PCA was applied to items in the Voice Disability Questionnaire and the Voice Impairment Coping Questionnaire, to determine the structure of these questionnaires. All the underlying items were ordered hierarchically in a decreasing order, with respect to accounted variance. Following the identification of a set of principle components for each of these questionnaires, the components were used in later analyses. The Varimax method (Kaiser, 1958) was used in this study.

2.2.11.3 Cluster Analysis

Responses to the Voice Impairment Coping Questionnaire were analysed by means of cluster analyses using the components derived from the principle component analysis of the questionnaire. Cluster analysis is a set of procedures which groups individuals into homogeneous groups on the basis of each subject's performance on a range of items (in this study, the Voice Impairment Coping Questionnaire). The aim of any clustering method is to create a classification scheme where individuals are allocated to a set of mutually exclusive groups, with individuals within a group being more similar to one another than to individuals in different groups.

Morris et al. (1981) describe seven major categories of cluster methods which include hierarchical agglomerative methods; hierarchical divisive methods; iterative partitioning techniques; density searching techniques; factor analysis variants; clumping techniques and graphic techniques. The methods used in this study are hierarchical agglomerative methods and iterative partitioning techniques. The former were performed in order to obtain the most appropriate number of groups, and the iterative technique was then employed to identify group membership.

2.2.11.4 t-tests, ANOVA and Chi-square

Chi-square analysis was used to examine the difference between independent samples using categorical data. T-tests were used to examine the difference between means of two independent groups (independent t-test), as well as the difference in the same group in different conditions (related t-test). In addition, two-factor and one-factor analyses of variance (ANOVA) were carried out, followed by post-hoc comparisons using Scheffe Test, when appropriate.

2.2.11.5 Multiple Linear Regression

Regression analysis is a method of analysing the effects of more than one independent variable on a dependent variable. In this study, multiple regression analysis was used (1) to determine which factors were associated with the key dependent measures, i.e. voice disability, depression, anxiety and self-esteem; and (2) to predict short and long term outcome of intervention.

2.3 PROCEDURE

Patients in the adductor spasmodic dysphonia (ASD) group were assessed on eight visits. Details of the assessments performed and the timing of each visit are shown in Table 2.1. Visit 1 was their initial visit to the Voice Clinic. On this visit, they had a full assessment which included a laryngostroboscopic examination and were asked to complete the Voice Disability Questionnaire. Visit 2 took place about a month following their first visit after they have had their neurological examination and voice therapy. Each patient underwent an individual interview during which they were asked to complete the questionnaires. Visit 3 was the day they had their first Botox injection. On this occasion, each patient had to fill in the Spielberger State Anxiety Inventory both before (3a) and immediately after (3b) the injection (this did not occur in the FD group). On visit 4, which took place one week following the first injection, patients had a full ear, nose and throat (ENT) examination and a fibreoptic video-laryngostroboscopy. Visit 5 took place three months following the first injection. The tasks included in visit 2 were repeated and patients were invited to have a second injection on visit 6. The same process was repeated following second injection.

In this study, the toxin solution was injected into the thyroarytenoid muscles bilaterally, guided by transcutaneous electromyography. Outcomes have been assessed largely on the basis of patients' subjective reports. Decisions about dosage, placement and interval between injections have been made on an empirical basis influenced by the patient's demands and clinical preferences of the clinician.

Table 2.1 Research protocol - adductor spasmodic dysphonia group

Visit 1 *1st visit*	**Visit 2** *Voice Clinic*	**Visit 3** *1st injection*	**Visit 4** *1 week post Botox*
Voice disability	Voice disability Locus of control Depression Anxiety Self-esteem Coping Social Support Expectations	Anxiety (3a pre & 3b post Botox)	Voice disability Depression Anxiety Satisfaction
Visit 5 *3 mths post Botox*	**Visit 6** *2nd injection*	**Visit 7** *1 week post Botox*	**Visit 8** *3 mths post Botox*
Voice disability Locus of control Depression Anxiety Self esteem Coping Social Support Expectations	Anxiety (6a pre & 6b post Botox)	Voice disability Depression Anxiety Satisfaction	Voice disability Locus of control Depression Anxiety Self esteem Coping Social Support Expectations

The FD patients, who were intended as a comparison group, were interviewed on two occasions before onset of voice therapy. Visit 1 was their initial visit to the Voice Clinic. On this occasion they had a full ENT examination including a video laryngostroboscopy and were asked to complete the Voice Disability Questionnaire. On visit 2 they were interviewed and assessed by the investigator using the assessments described in Table 2.2. They then commenced a course of voice therapy for approximately four to eight weeks (visit 3). Visit 4 took place upon termination of therapy, prior to discharge. Visit 5 took place three months later. On this occasion, patients were re-assessed, using the same measures used at visit 2. Visits and measures used on each visit , for the FD group, are shown in Table 2.2.

Table 2.2 Research protocol - functional dysphonia group

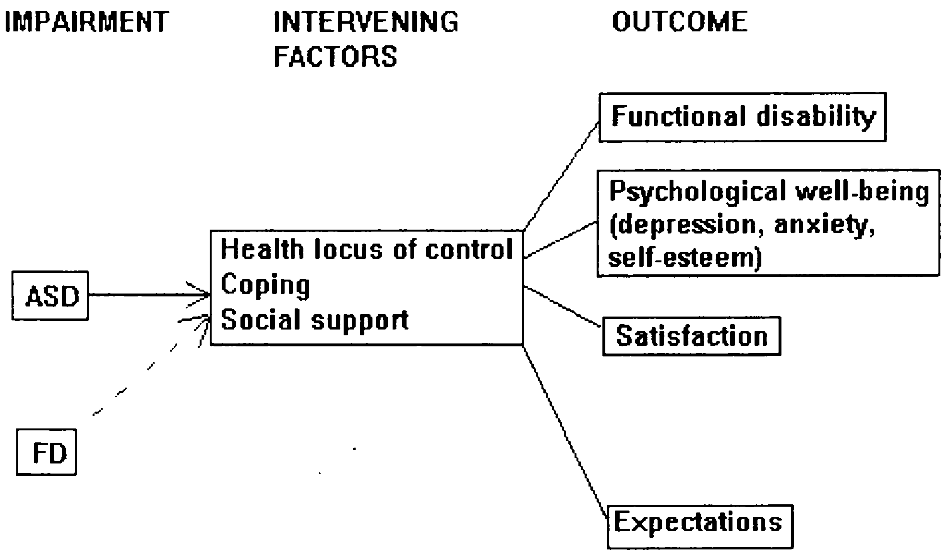
Visit 1 *1st visit*	Visit 2 *Voice Clinic*	Visit 3 *Intervention*	Visit 4 *post therapy*	Visit 5 *3 mths review*
Voice disability	Voice disability Locus of control Depression Anxiety Self esteem Coping Social Support Expectations	Voice therapy	Voice disability Depression Anxiety Satisfaction	Voice disability Locus of control Depression Anxiety Self esteem Coping Social Support

Data from all visits is presented in the thesis.

2.4 THE MODEL OF THE STUDY

The study was based on a model designed to examine the efficacy of intervention and the influence of psychological and social factors on outcome, using the model of Lazarus (1991) as explained in the literature review. This is laid as follows in Figure 2.1.

Figure 2.1 The model of the study



CHAPTER 3 RESULTS

COMPARISON BETWEEN ASD AND FD GROUPS

3.1 SAMPLE CHARACTERISTICS

The characteristics of the ASD and FD groups are presented below (Table 3.1). Sex, age, symptom length and marital status will also be shown separately.

Table 3.1 Comparison between the ASD and FD grroups

	ASD	FD	t/x^2	p
n	(40)	(40)		
% MALES	42.5	27.5	$x^2 = 1.97$	ns
AGE	49.7 (16.28)	41.1 (19.56)	t = 2.13	ns
SYMPTOM LENGTH	65.1 (69.00)	8.3 (8.37)	t = 5.16	.001
% MARRIED	62.5	37.5	$x^2 = 5.00$	ns

Standard deviation in brackets.
ns= not significant

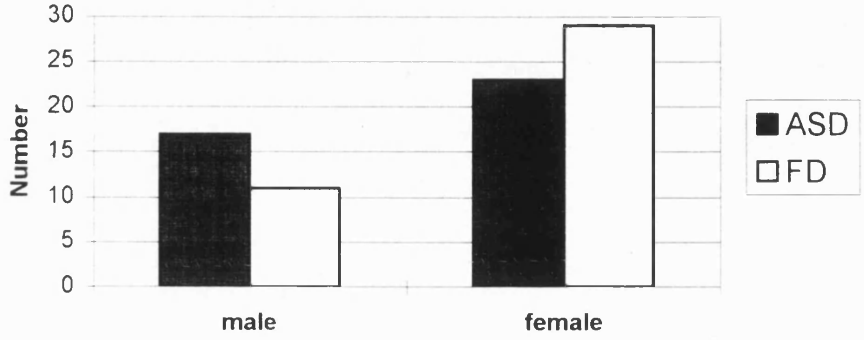
The ASD group consisted of 40 subjects, 17 males and 23 females. The mean age was 49.7 years (sd 16.2). Twenty five subjects were married. Length of symptoms ranged from one to twenty seven years, with a mean length of 65.1 months (sd 69.01).

The FD group consisted of 40 subjects, 11 males and 29 females. The mean age was 41.1 years (sd 19.57). Fifteen subjects were married. Length of symptoms ranged from one to thirty six months, with a mean of 8.3 months (sd 8.38).

Sex

The ASD and FD groups consisted of eighty subjects, 28 males (35%) and 52 females (65%). Figure 3.1 shows the sex distribution in the group. No sex differences were found between the two groups (chi-sq. = 1.97, df = 1,ns).

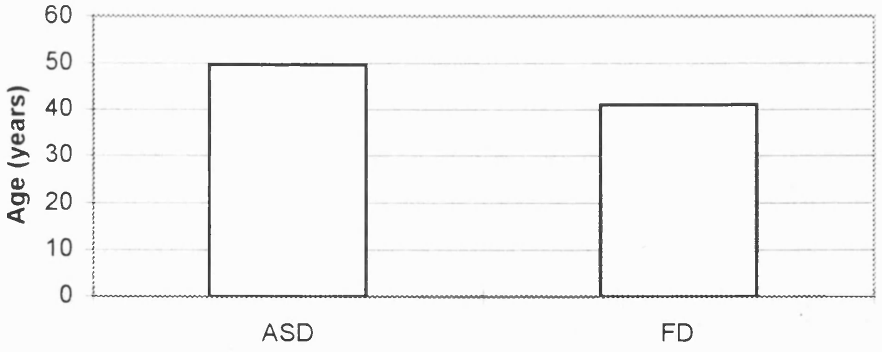
Figure 3.1 ASD & FD Groups
Sex



Age

Mean age was 45.4 , ranging from 21 to 81 years. Figure 3.2 shows mean age for the group.

Figure 3.2 ASD & FD Groups
Mean Age

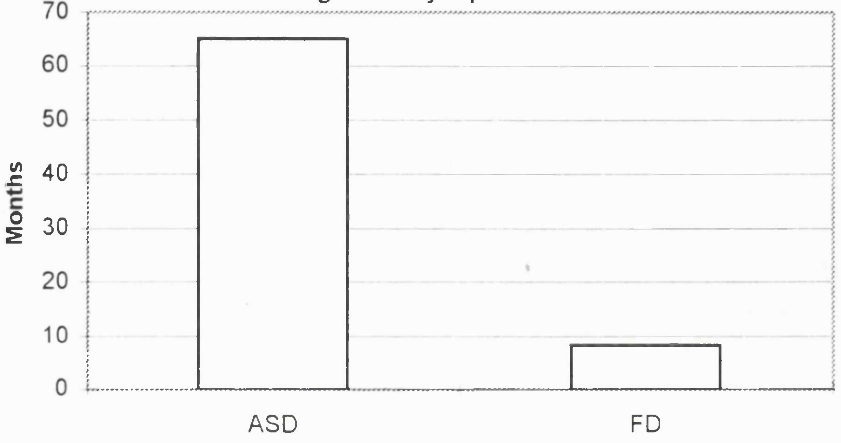


T-tests were performed to compare the mean age of the ASD and FD subjects. This indicated no significant difference between the two groups.

Length of symptoms

Mean length of symptoms was 36.7 months, ranging from 1 to 324 months. Figure 3.3 shows mean length of symptoms for the groups.

Figure 3.3 ASD & FD Groups
Length of Symptoms

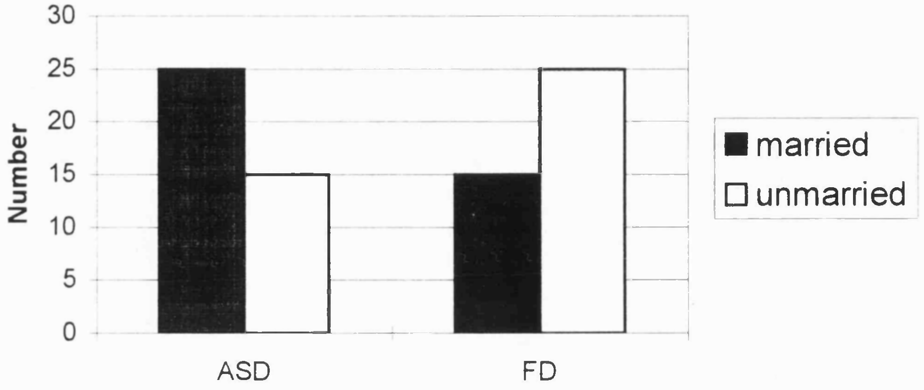


T-tests were performed to compare mean length of symptoms in ASD and FD groups. This indicated significant difference in length of symptoms between the two groups.

Marital status

Forty out of the eighty subjects were married. Marital status distribution in the ASD and FD groups is shown in Figure 3.4.

Figure 3.4 ASD & FD Groups
Marital Status



No significant differences in marital status were found between the ASD and FD groups (chi-square = 5.00, df = 1, p= .0253).

3.2 VOICE DISABILITY

The FD group was assessed four times in attempt to mirror the time course of the ASD group. Subjects were therefore seen at visit 1 (assessment visit), visit 2 (before intervention), visit 4 (following intervention), and visit 5 (three months following intervention). Except for the content of intervention (visit 3), it is clear that these two types of intervention are different. Voice therapy, used in the FD group, is expected to have a long term effect, whereas the Botox injection is an acute intervention from which short term results are expected. Analyses for comparison between the ASD and FD groups will therefore include assessments made on visits 1,2,4 and 5.

3.2.1 Voice Disability Questionnaire- Total Score Changes Over Time. ASD and FD Groups

The overall performance of the ASD and FD groups on the Voice Disability Questionnaire was examined across visits, treating the Voice Disability Questionnaire as a unitary questionnaire, i.e. examining total scores.

Table 3.2 shows the means and standard deviation of scores of the Voice Disability Questionnaire across visits for FD and ASD groups

Table 3.2 Means and standard deviations of voice disability - FD and ASD groups

Voice Disability	FD	ASD
	Mean	Mean
Initial visit	42.2 (13.2)	60.9 (11.2)
Before intervention	39.3 (14.5)	59.2 (11.9)
Following intervention	38.0 (10.0)	53.6 (14.0)
Three mths. following intervention	38.5 (10.0)	56.2 (12.9)

Standard deviation in brackets.

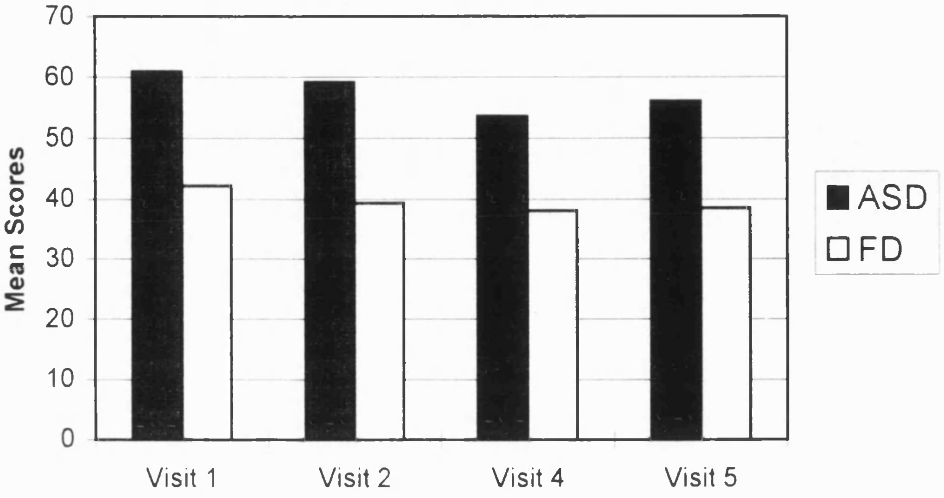
Table 3.3 shows the results of a two-factor repeated measures ANOVA which was conducted on both ASD and FD groups to examine voice disability total scores across four visits.

Table 3.3 Two-factor repeated measures ANOVA of voice disability total scores- ASD and FD groups

Source	df	Sum of Squares	Mean Square	F-test	p
Groups	1	25830.1	25830.1	51.5	.0001
subjects w.groups	78	39138.7	501.8		
Repeated Measures	3	1489.8	496.6	14.2	.0001
AB	3	200.2	66.7	1.9	.1283
Bx subjects w. groups	234	8165.3	34.9		

As can be seen, significant differences were found between groups (F = 51.5; df 1, p<.001) and between visits (F = 14.2; df 3, p<.001) however, no significant interaction was found between the two groups. This indicates that the ASD and FD groups did not behave differently over time. However, the voice disability scores between the two groups were significantly higher in the ASD group. Figure 3.5 shows mean voice disability total scores across visits in ASD and FD groups.

Figure 3.5 Mean Scores on Voice Disability Questionnaire across visits ASD & FD Groups



3.2.2 The Structure of the Voice Disability Questionnaire (VDQ) (See Appendix - 1)

3.2.2.1 The structure of the Voice Disability Questionnaire - ASD Group

The use of a total score of the VDQ is questionable as the questionnaire might have an inherent structure. To examine whether this was the case, a principal component analysis was performed, initially on the ASD group, as this was the principal focus of this thesis.

Examination of the Voice Disability Questionnaire (VDQ) data at visit 1 revealed that 17 out of the 40 ASD subjects had not rated items 9-13 : these questions were the work related items which were not applicable to many of the subjects. These items were therefore excluded from further analysis. Scores from the remaining 23 items were analysed using principal component analysis with varimax rotation. Components whose eigenvalues were one or greater were retained and loadings greater than 0.50 were considered significant. This produced five components which are described in Table 3.4. Item 23 failed to load highly on any component. Items 3,15 and 21 were removed as they had high loadings on more than one component. The Cronbach's alphas for each of the resulting components (Table 3.4) were all above 0.6 demonstrating an acceptable level of internal consistency.

The components were labelled according to the best description of the commonalties of the items.

Table 3.4 Components of Voice Disability Questionnaire (VDQ) - ASD Group

Description of Component	Item No.	Loading	Eigenvalue	Cronbach Alpha
1 Social isolation	Q14	0.788	6.642	0.8960
	Q16	0.728		
	Q17	0.574		
	Q18	0.801		
	Q19	0.731		
	Q20	0.550		
	Q22	0.655		
	Q28	0.744		
2 Negative communication	Q4	0.816	3.553	0.7745
	Q5	0.746		
	Q7	0.812		
3 Public avoidance	Q25	0.844	1.850	0.7977
	Q26	0.667		
	Q27	0.670		
4 Limited understanding	Q1	0.849	1.332	0.7199
	Q2	0.763		
5 Communication difficulty	Q6	0.785	1.019	0.6275
	Q8	0.739		
	Q24	0.547		

The numbered items on Table 3.4 are listed below in the order they appear on the table:

Component 1- Social Isolation

Q14: I go out to visit people less often because of my voice problem

Q16: Because of my voice problem, I tend to do inactive pastimes which do not involve talking, for example, I watch TV more, play cards or read books.

Q17: Because of my voice problem, I take part in fewer community activities.

Q18: I show more interest in other people's problems because I cannot communicate with them.

Q19: Because of my voice problem I avoid having visitors.

Q20: Because of my voice problem, I make demands on other people or members of my family, for example, I insist they do the talking for me.

Q22: I do not go out to visit people at all because of my voice problem.

Q28: Because of my voice I stay at home most of the time.

Component 2- Negative Communication

Q4: Because of my voice, I talk less to other people.

Q5: Because of my voice problem, I have trouble speaking in a noisy setting.

Q7: Because of my voice problem, I cannot have a good discussion.

Component 3- Public Avoidance

Q25: Because of my voice problem, I do not do the shopping that I would like to do.

Q26: It is difficult for me to complain at the shop because of my voice problem.

Q27: Because of my voice problem, I avoid using public transport.

Component 4- Limited Understanding

Q1: Because of my voice problem, I communicate mostly by nodding my head, pointing or using sign language, or gestures.

Q2: Because of my voice problem, my speech is understood only by a few people who know me well.

Component 5- Communication Difficulty

Q6: Because of my voice problem, I often have to repeat my statements to make myself understood.

Q8: Because of my voice problem I have trouble using the telephone.

Q24: Because of my voice problem I am a burden on others.

In order to examine the stability of the VDQ, components were compared across two visits (visit 1,2) prior to intervention. The analysis suggested a relatively consistent structure as shown in Table 3.5. Items 15 (I go out less often because of my voice problem), 21 (Because of my voice problem I isolate myself as much as I can from the rest of my family), 22 (I do not go out to visit people at all because of my voice problem), 24 (Because of my voice problem I am a burden on others) were removed from the analysis as they showed high loadings on more than one component. The Cronbach's alphas for each of the components were all above 0.6, demonstrating an acceptable level of internal consistency.

Table 3.5 Comparing components of VDQ at visit 1 and 2

	Visit 1			Visit 2		
		Loading	Cronbach Alpha		Loading	Cronbach Alpha
Component 1	Q14	.823	.9269	Q14	.788	.8960
	Q15	.815		**Q15**	**.608***	
	Q16	.796		Q16	.728	
	Q17	.733		Q17	.578	
	Q18	.725		Q18	.801	
	Q19	.799		Q19	.731	
	Q20	**.353**		Q20	.550	
	Q22*	.621		Q22	.655	
	Q27	.511		**Q27**	**.477**	
	Q28	.774		Q28	.744	
Component 2	Q4	.864	.7920	Q4	.816	.7745
	Q5	.687		Q5	.746	
	Q7	.821		Q7	.810	
Component 3	Q20	.712	.7695	**Q20**	**.142**	.7977
	Q24*	.582		**Q24**	**.205**	
	Q25	.631		Q25	.844	
	Q26	.575		Q26	.667	
	Q27	**.241**		Q27	.670	
Component 4	Q1	.746	.7162	Q1	.849	.7911
	Q2	.783		Q2	.763	
	Q3	.655		**Q3**	**.239**	
Component 5	Q6	.746	.7927	Q6	.785	.6275
	Q8	.740		Q8	.739	
	Q21	.679		**Q21**	**.547***	
	Q22*	.534		**Q22**	**.417**	
	Q24*	.575		Q24	.547	

* High loadings on more than one component.

Figures in bold show the loadings that the question had on that component although not included in the analysis.

The reliability of the VDQ was examined. Table 3.6 shows item by item correlations of the VDQ at visit 1 (first visit) and visit 2 (before intervention). No intervention occurred between visit 1 and visit 2. Each item was found to have an r above 0.75, suggesting that the VDQ shows acceptable test- retest reliability.

Table 3.6 Correlations of VDQ items at visits 1 and 2

VDQ ITEMS	VISITS 1 & 2
Q 1	.7551
Q 2	.8022
Q 3	.8731
Q 4	.8672
Q 5	.8793
Q 6	.8919
Q 7	.9287
Q 8	.9476
Q 9	.9812
Q 10	.9316
Q 11	.8307
Q 12	.9477
Q 13	.7971
Q 14	.8975
Q 15	.9020
Q 16	.8796
Q 17	.7740
Q 18	.8623
Q 19	.8073
Q 20	.9321
Q 21	.8611
Q 22	.8341
Q 23	.8953
Q 24	.9155
Q 25	.8370
Q 26	.9449
Q 27	.8491
Q 28	.9000

3.2.2.2 The structure of the Voice Disability Questionnaire- FD Group

In order to establish whether the structure found on the ASD group for the VDQ applied to the comparison group (FD), a similar analysis was carried out. As with the ASD group, questions 9-13 were excluded from this analysis to ensure adequate comparison. Principal component analysis with varimax rotation yielded five components which are described in Table 3.7. Items 4,7,21 and 23 were removed as they had high loadings on more than one factor. Item 8 was removed, as it failed to load highly on any component. The Cronbach's alphas for each of the resulting components were all above 0.6, demonstrating an acceptable level of internal consistency.

Table 3.7 Components of the VDQ - FD group

Description of Component	Item No.	Loading	Eigenvalue	Cronbach Alpha
1 Social isolation	Q14	0.915	10.472	0.9464
	Q15	0.784		
	Q16	0.821		
	Q17	0.887		
	Q19	0.635		
	Q20	0.695		
	Q22	0.769		
	Q28	0.661		
2 Public avoidance	Q24	0.715	2.468	0.7914
	Q25	0.776		
	Q27	0.775		
3 Non specific	Q26	0.748	2.026	
4 Limited communication	Q1	0.534	1.521	0.7260
	Q5	0.727		
	Q6	0.713		
5 Limited understanding	Q2	0.868	1.281	0.8609
	Q3	0.902		

The numbered items on Table 3.7 are listed below in the order they appear on the table:

Component 1- Social Isolation

Q14: I go out to visit people less often because of my voice problem

Q15: I go out less often because of my voice problem.

Q16: Because of my voice problem, I tend to do inactive pastimes which do not involve talking, for example, I watch TV more, play cards or read books.

Q17: Because of my voice problem, I take part in fewer community activities.

Q19: Because of my voice problem I avoid having visitors.

Q20: Because of my voice problem, I make demands on other people or members of my family, for example, I insist they do the talking for me.

Q22: I do not go out to visit people at all because of my voice problem.

Q28: Because of my voice I stay at home most of the time.

Component 2- Public Avoidance

Q24: Because of my voice problem, I am a burden on others.

Q25: Because of my voice problem, I do not do the shopping that I would like to do.

Q27: Because of my voice problem, I avoid using public transport.

Component 3 (non specific)

Q26: It is difficult for me to complain at the shop because of my voice problem.

Component 4- Limited Communication

Q1: Because of my voice problem, I communicate mostly by nodding my head, pointing or using sign language, or gestures.

Q5: Because of my voice problem, I have trouble speaking in a noisy setting.

Q6: Because of my voice problem, I often have to repeat my statements to make myself understood.

Component 5- Limited Understanding

Q2: Because of my voice problem, my speech is understood only by a few people who know me well.
Q3: Because of my voice problem, I am understood with difficulty.

3.2.3 The Structure of the Voice Impairment Coping Questionnaire (Appendix 2)

3.2.3.1 ASD Group

Coping was assessed by means of the Voice Impairment Coping Questionnaire which was devised by the author to assess different coping strategies. In order to analyse the structure of the coping questionnaire, scores from the twenty seven items were analysed, using principal component analysis with varimax rotation. Only components whose eigenvalues were 1.5 or greater were retained. Loadings greater than 0.5 were considered significant. The analysis produced initially six components, but one component, 'psychological avoidance', was removed as the Cronbach's alpha for this component was unacceptably low (.4981). Items 16 and 19 were therefore taken out. Items 1, 3, 4, 10, 11, 14, 15, 18, 22 and 26 were removed as they either failed to load highly on any component or had high loading on more than one component. This resulted in five components which are described in Table 3.8: 'physical avoidance', 'information seeking', 'social comparison/distraction', 'finding new meaning' and 'religion/wishful thinking'. The Cronbach's alphas for each of the remaining components were all above 0.6, demonstrating an acceptable level of internal consistency.

TABLE 3.8 -Components of the Voice Impairment Coping Questionnaire-ASD Group				
Component	Item No.	Loading	Eigenvalue	Cronbach Alpha
1. physical avoidance	Q17	0.811	5.526	0.7833
	Q21	0.706		
	Q25	0.865		
2. information seeking	Q8	0.507	3.388	0.7698
	Q13	0.787		
	Q27	0.863		
3. social comparison/distraction	Q2	0.801	2.633	0.6796
	Q5	0.677		
4. finding new meaning	Q6	0.613	2.478	0.7191
	Q9	0.533		
	Q12	0.840		
	Q20	0.617		
5. religion/wishful thinking	Q7	0.780	1.612	0.6472
	Q24	0.792		

Items are listed below in the order they appear in Table 3.8. The components were labelled according to the best description of the commonalties of the items .

Component 1-Physical avoidance

Q17: I try to avoid situations where my voice problem would become evident.

Q21: I ask people to help me with those things I cannot manage because of my voice problem.

Q23: I find it easier to cope with my problem if I do not use my voice.

Component 2- Information seeking

Q8: I find it easier to cope with my voice problem if I ask the doctor questions about it.

Q13: I try to find as much information as possible about my voice problem.

Q27: I find it easier to cope with my voice problem by finding out as much about it as I can.

Component 3- Social comparison/distraction

Q2: I try to become involved in as many physical activities as possible to take my mind off my voice problem.

Q5: I find it easier to cope with my voice problem when I compare myself to other people who have worse health problems.

Component 4- Finding new meaning

Q6: Having a voice problem has helped me to find some important truth about life.

Q9: I find it easier to cope with my voice problem by expressing my feelings outwardly.

Q12: Having a voice problem has helped me develop into a better person.

Q20: Resting my voice at times, helps me cope with my problem.

Component 5- Religion/wishful thinking

Q7: I find religion and praying to God help me cope with my voice problem.

Q24: I find it easier to cope with my problem by wishing that it would go away or somehow be over with.

3.2.3.2 The Structure of the Voice Impairment Coping Questionnaire- FD Group

In order to establish whether the Voice Impairment Coping Questionnaire applied to the comparison group (FD), a similar analysis was carried out, with the aim of finding out whether the questionnaire retained its structure. Principal component analysis with varimax rotation resulted in five components which are described in Table 3.9.

TABLE 3.9 - Components of the Voice Impairment Coping Questionnaire- FD Group

Component	Item No.	Loading	Eigenvalue	Cronbach Alpha
1. Eliciting social support	Q1	0.654	4.965	0.828
	Q4	0.842		
	Q8	0.694		
	Q9	0.825		
2. Wishful thinking	Q7	0.532	4.168	0.610
	Q14	0.696		
	Q15	0.599		
	Q21	0.544		
	Q24	0.802		
3. Physical avoidance	Q17	0.518	2.327	0.762
	Q20	0.632		
	Q23	0.826		
	Q25	0.715		
4. Information seeking	Q13	0.898	2.076	0.879
	Q27	0.817		
5. Unclear (mixed)	Q16	0.780	1.462	0.680
	Q18	0.614		
	Q21	0.590		
6.Finding new meaning	Q6	0.730	1.3215	0.7431
	Q12	0.898		

Items are listed below in the order they appear in Table 3.9. The components were labelled according to the best description of the commonalties of the items .

Component 1- Eliciting social support

Q1: I find talking with friends and family about my voice problem helpful.

Q4: It helps me cope with my voice problem if other people are sympathetic.

Q8: I find it easier to cope with my voice problem if I ask the doctor questions about it.

Q9: I find it easier to cope with my voice problem by expressing my feelings outwardly.

Component 2- Wishful thinking

Q7: I find religion and praying to God help me cope with my voice problem.

Q14: I take the view that there is very little I can do about my voice problem.

Q15: I find myself wishing that I never had a voice problem.

Q21: I ask people to help me with those things I cannot manage because of my voice problem.

Q24: I find it easier to cope with my problem by wishing that it would go away or somehow be over with.

Component 3- Physical avoidance

Q17: I try to avoid situations where my voice problem would become evident.

Q20: Resting my voice at times, helps me cope with my problem.

Q23: I find it easier to cope with my problem if I do not use my voice.

Q25: I find it easier to cope with my voice problem by avoiding being with people in general.

Component 4- Information seeking

Q13: I try to find as much information as possible about my voice problem.

Q27: I find it easier to cope with my voice problem by finding out as much about it as I can.

Component 5- Unclear (mixed)

Q16: I try to ignore my voice problem by looking only at the good things in my life.

Q18: When my voice gets bad, I find myself taking it on others around me.

Q21: I ask people to help me with those things I cannot manage because of my voice problem.

Component 6- Finding new meaning

Q6: Having a voice problem has helped me to find some important truth about life.

Q12: Having a voice problem has helped me develop into a better person.

3.3 PSYCHOLOGICAL WELL-BEING IN ASD AND FD GROUPS (DEPRESSION, ANXIETY, SELF-ESTEEM)

Depression and anxiety were assessed on three occasions in the ASD and FD groups: before intervention, one week post intervention and three months following intervention. Self-esteem was assessed on two occasions, before intervention and three months following intervention. Where comparisons are made between the ASD and FD groups, analyses are limited to one Botox injection. The results are presented herewith.

3.3.1 Depression in ASD and FD groups

Table 3.10 shows mean depression ratings of ASD and FD subjects before intervention (visit 2), following intervention (visit 4) and three months following intervention (visit 5). For the ASD group intervention is first Botox injection, whilst for the FD group, intervention is voice therapy.

Table 3.10 Means and standard deviations of depression scores before and after intervention. ASD & FD groups

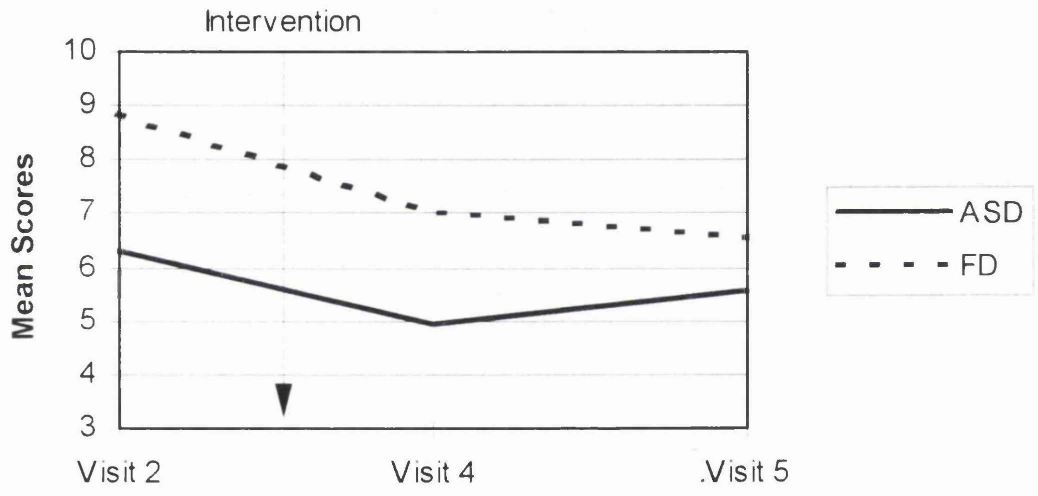
Depression	ASD	FD
	Mean	Mean
Before intervention	6.30 (4.36)	8.87 (7.67)
Following intervention	4.95 (3.96)	7.00 (5.83)
Three mths. post intervention	5.58 (4.56)	6.53 (5.92)

Standard deviation in brackets.

A two-factor repeated measures ANOVA was conducted to examine whether depression ratings changed over time. This indicated that there was no significant difference across visits (F = 3.09; df1, p=.083). No significant difference was found between groups (F = 1.70; df2, p=.186). No significant interaction was found between groups (F=8.59; df2, p=.191).

Figure 3.6 shows levels of depressed mood in ASD and FD groups prior to and following intervention.

Figure 3.6 Depression Scores pre & post Intervention - ASD & FD Groups



In summary, no significant difference in levels of depressed mood was found between FD and ASD groups or between visits before and after intervention.

3.3.2 Anxiety in ASD and FD groups

Table 3.11 shows mean anxiety ratings of ASD and FD subjects before intervention (visit 2), following intervention (visit 4) and three months following intervention (visit 5). For the ASD group intervention is first Botox injection, whilst for the FD group, intervention is voice therapy.

Table 3.11 Means and standard deviations of anxiety before and after intervention. ASD & FD groups

Anxiety	ASD	FD
	Mean	Mean
Before intervention	38.8 (9.9)	43.8 (10.4)
Following intervention	34.1 (7.9)	37.6 (9.6)
Three mths. post intervention	37.9 (11)	40.8 (7.5)

Standard deviation in brackets.

A two-factor repeated measures ANOVA was performed to examine whether self reported anxiety changed over time. Results shown in Table 3.12 indicate significant difference between visits (F = 12.8; df 2, p<.001) however, no significant interaction (F=4.8; dfl, p=.031) or differences were found between groups (F= .5; df 2, p=.5815).

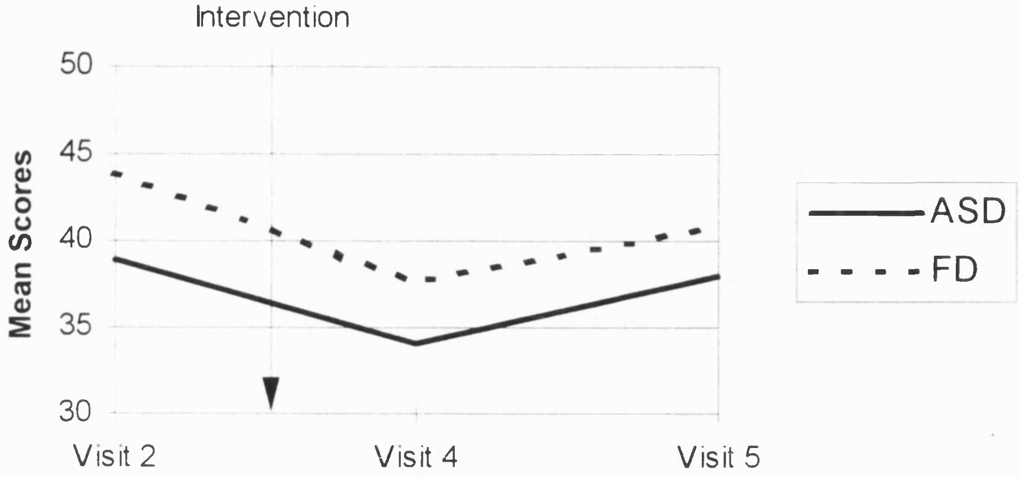
Table 3.12 Two- Factor Repeated Measures ANOVA ASD & FD groups by anxiety

Source	df	Sum of Squares	Mean Square	F-test	p
GROUP (A)	1	852.5	852.5	4.8	.0312
subjects w. groups	77	13620.7	176.2		
Repeated Measures	2	1190.8	595.4	12.8	.0001
AB	2	50.6	25.3	.5	.5815
Bx subjects w groups	154	7155.3	46.5		

In order to examine where these differences occurred, post hoc comparisons (Scheffe) were performed. These indicated significant differences (F= 4.5, p<.05) in anxiety between visit 2 (pre intervention) and visit 4 (following intervention).

Figure 3.7 describes the mean self reported anxiety ratings at each visit, for ASD and FD groups.

Figure 3.7 Mean Anxiety Scores at Visits 2, 4 & 5
ASD & FD Groups



3.3.3 Self-esteem in ASD and FD groups

Self-esteem was measured twice, when comparing the ASD and FD groups; before intervention and three months following intervention. Table 3.13 shows mean self-esteem ratings of ASD and FD subjects at these time points.

Table 3.13 Means and standard deviations of self-esteem scores before and after intervention.
ASD & FD groups

Self-esteem	ASD	FD
	Mean	Mean
Before intervention	29.7 (2.3)	27.7 (2.1)
Three mths. post intervention	30.1 (2.0)	28.8 (1.9)

Standard deviation in brackets.

A two-factor repeated measures ANOVA was performed to examine whether self-esteem changed over time. Results shown in Table 3.14 indicate significant difference between visits (F= 9.5; df 1, p<.002), as well as significant differences between groups (F= 8.1; df 1, p<.005). No significant interaction was found between groups (F= 1.8; df 1, p=.1809).

Table 3.14 Two- factor repeated measures ANOVA ASD & FD groups by self-esteem

Source	df	Sum of Squares	Mean Square	F-test	p
GROUP (A)	1	110.6	110.6	9.5	.002
subjects w. groups	78	905.5	11.6		
Repeated Measures	1	23.3	23.3	8.1	.005
AB	1	5.3	5.3	1.8	.1809
Bx subjects w groups	76	225	2.9		

In order to examine where these differences occurred, post hoc comparisons (Scheffe) were performed. These indicated significant differences (F= 3.5, p<.05) in self-esteem between visit 2 (pre intervention) and visit 4 (following intervention).

CONCLUSION

Comparison of mean length of symptoms in ASD and FD groups showed significant differences between the two groups; symptom length in the ASD group was significantly higher than the FD group. Comparison of the voice disability total score between the ASD and FD groups showed significant differences between the two groups, in that level of disability in the ASD group was significantly higher than the FD group. Furthermore, the principal dependent measure of voice disability (the Voice Disability Questionnaire), and one of the principal intervening measures (the Voice Impairment Coping Questionnaire), had a different structure in the ASD group as compared with the FD group. For these reasons, further comparisons between the ASD and the FD groups will not be considered. For completeness, differences in depression, anxiety and self-esteem have been shown. All subsequent analyses will be based on the ASD group only, which is the focus of this thesis.

CHAPTER 4 RESULTS

ASD GROUP

4.1CHANGES OVER TIME

4.1.1 Changes in Voice Impairment

An analysis was carried out comparing self reported voice disability with speech & language therapists' perceptual ratings. Assessment of voice quality was performed by two speech and language therapists, using the Buffalo Voice Profile III, prior to and one week after intervention. To examine the degree of agreement between the two speech and language therapists, Pearson correlations were performed on their assessment of the subjects, for the three criteria of interest; 'muscles hypertense', 'laryngeal tone breathy' and 'overall voice'. A high level of concordance was found between the two therapists on all three scales; 'laryngeal tone breathy' $r = 0.76$, 'muscles hypertense' $r = 0.84$, 'overall voice' $r = 0.82$, ($p<0.001$ (2-tailed) on each criteria). As a result, both therapists' ratings were combined into a single score on each of the three measures for further analysis.

Related t-tests were performed to compare the mean therapists' ratings of voice before and after intervention. This indicated significant change on the scales of 'muscles hypertense' and 'overall voice' but not on 'laryngeal tone breathy' (Table 4.1). Lower scores indicate an improvement.

Table 4.1 t-tests comparing therapists mean assessments pre and post intervention

Criteria	Visit 2	Visit 4	t	1-tailed
Laryngeal tone (breathy)	1.96 (1.23)	1.86 (0.99)	0.7	ns
Muscles hypertense	3.09 (1.25)	1.99 (0.79)	6.7	p<0.001
Overall	3.63 (0.92)	2.44 (0.84)	7.25	p<0.001

Intervention occurred between at visit 3.
Standard deviation in brackets
ns = non significant.

4.1.2 Changes in Voice Disability

4.1.2.1 Changes in VDQ total score

Table 4.2 shows the mean total scores for ASD group on the VDQ across all visits.

Table 4.2 Means and standard deviations of voice disability across visits - ASD group

Voice disability	Mean
Initial visit	60.9 (11.2)
Before intervention	59.2 (11.9)
One week following first intervention	53.6 (14.0)
Three months following first intervention	56.2 (12.9)
One week following second intervention	51.8 (13.4)
Three months following second intervention	52.9 (12.9)

Standard deviation in brackets.

A one-factor repeated measures ANOVA (Table 4.3) was performed to examine whether voice disability changed over time. This indicated significant differences at .0001 level between subjects (F = 7.1; df 39) and visits (F = 9; df 5).

Table 4.3 One-factor repeated measures ANOVA voice disability total score

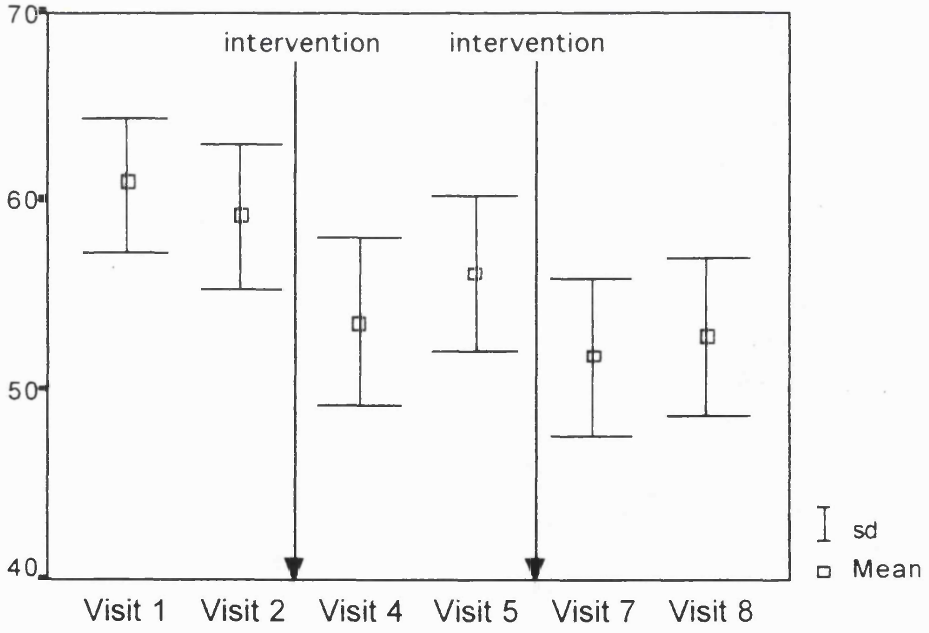
Source	df	Sum of Squares	Mean Square	F-test	P
Between subjects	39	21384.1	548.3	7.1	.0001
Within subjects	160	12420.8	77.6		
Visits	5	2322.9	580.7	9	.0001
residual	156	10097.9	64.7		
Total	199	33804.9			

In order to examine where these differences occurred, post hoc comparisons (Scheffe) were performed which indicated that both the pre-intervention visits (1 & 2) were significantly different (visit 1 F= 4.2; visit 2 F= 2.5, p<.05) from visit 4 (one week following first intervention), and visit 7 (one week following second intervention) (visit 1 F= 6.5; visit 2 F= 4.3, p<.05).

Figure 4.1 shows the fluctuating levels of voice disability across visits in ASD group.

Figure 4.1 Changes in Voice Disability over Time

ASD Group



In summary, total scores of voice disability changed significantly at two time points; voice disability decreased significantly one week following first intervention and one week following second intervention, when compared with voice disability both at the initial visit and before first intervention.

4.1.2.2 Changes in VDQ components

Changes in voice disability components were examined over time.

4.1.2.2.1 Changes in 'social isolation' (component 1)

An analysis of voice disability component 1, 'social isolation', was performed across visits. Table 4.4 shows means and standard deviations of social isolation across visits.

Table 4.4 Means and standard deviations of social isolation across visits - ASD group

Voice Disability Component 1	Mean
Initial visit	22.5 (7.3)
Before intervention	23.1 (7.0)
One week post 1st intervention	19.2 (7.3)
Three months post 1st intervention	20.1 (7.3)
One week post 2nd intervention	18.5 (6.8)
Three months post 2nd intervention	18.1 (6.7)

Standard deviation in brackets.

A one-factor repeated measures ANOVA (Table 4.5) was performed to examine whether 'social isolation' changed over time. This indicated significant differences between subjects (F = 7.9; df 39, p<.001) and visits (F = 8.6; df 5, p<.001).

Table 4.5 One-factor repeated measures ANOVA 'social isolation' (VDQ component 1)

Source	df	Sum of Squares	Mean Square	F-test	P
Between subjects	39	7618	195.3	7.9	.0001
Within subjects	200	4971	24.9		
Visits	5	894	178.8	8.6	.0001
residual	195	4077	20.9		
Total	239	12589			

In order to examine where these differences occurred, post hoc comparisons (Scheffe) were performed which indicated that visit 1 (initial visit) was significantly different (F= 3.1, $p<.05$) from visit 7 (one week following second intervention) and visit 8 (three months following second intervention) (F= 3.7, $p<.05$). Visit 2 (before first intervention) was significantly different (F= 3, $p<.05$) from visit 4 (one week following first intervention), visit 7 (one week following second intervention) (F= 4.1, $p<.05$) and visit 8 (three months following second intervention) (F= 4.9, $p<.05$).

These results indicate that 'social isolation' decreased significantly one week following second intervention, with a further decrease three months following second intervention, when compared with 'social isolation' at the initial visit. Furthermore, a significant decrease in 'social isolation' was also noted at one week following first intervention, as well as at three months following second intervention, when compared with pre-intervention 'social isolation'.

4.1.2.2.2 Changes in 'negative communication' (component 2)

An analysis of voice disability component 2, 'negative communication', was performed across visits. Table 4.6 shows means and standard deviations of 'negative communication' across visits.

Table 4.6 Means and standard deviations of 'negative communication' across visits - ASD group

Voice Disability Component 2	Mean
Initial visit	12.5 (2.3)
Before intervention	12.1 (2.3)
One week post 1st intervention	10.9 (2.9)
Three months post 1st intervention	11.6 (2.4)
One week post 2nd intervention	10.5 (2.8)
Three months post 2nd intervention	11.1 (2.7)

Standard deviation in brackets.

A one-factor repeated measures ANOVA (Table 4.7) was performed to examine whether 'negative communication' changed over time. This indicated significant differences between subjects (F = 5.7; df 39, p<.001) and visits (F = 6.5; df 5, p<.001).

Table 4.7 One-factor repeated measures ANOVA 'negative communication' (VDQ component 2)

Source	df	Sum of Squares	Mean Square	F-test	p
Between subjects	39	883.4	22.7	5.7	.0001
Within subjects	200	796.3	4		
Visits	5	113.4	22.7	6.5	.0001
residual	195	683	3.5		
Total	239	1679.7			

In order to examine where these differences occurred, post hoc comparisons (Scheffe) were performed which indicated that visit 1 (initial visit) was significantly different (F= 2.7, p<.05) from visit 4 (one week following first intervention) and from visit 7 (one week following second intervention) (F= 4.5, p<.05). Visit 2 (before first intervention) was significantly different (F= 3, p<.05) from visit .7 (one week following second intervention).

These results indicate therefore that 'negative communication' decreased significantly one week following first intervention, when compared with the initial visit. Significant decrease in 'negative communication' was also noted at one week following second intervention, when compared with 'negative communication' pre-intervention.

4.1.2.2.3 Changes in 'public avoidance' (component 3)

An analysis of voice disability component 3, 'public avoidance', was performed across visits. Table 4.8 shows means and standard deviations of 'public avoidance' across visits.

Table 4.8 Means and standard deviations of 'public avoidance' across visits - ASD group

Voice Disability Component 3	Mean
Initial visit	7.6 (2.9)
Before intervention	7.7 (3.0)
One week post 1st intervention	6.8 (3.0)
Three months post 1st intervention	7.2 (2.6)
One week post 2nd intervention	6.6 (2.7)
Three months post 2nd intervention	7.1 (2.8)

Standard deviation in brackets.

A one-factor repeated measures ANOVA (Table 4.9) was performed to examine whether 'public avoidance' changed over time. This indicated significant differences between subjects (F = 7.1; df 39, p<.001) but not between visits (F = 1.9; df 5, p=.1032).

Table 4.9 One-factor repeated measures ANOVA 'public avoidance' (VDQ component 3)

Source	df	Sum of Squares	Mean Square	F-test	p
Between subjects	39	1106.5	28.4	7.1	.0001
Within subjects	200	794.8	4		
Visits	5	36.2	7.2	1.9	.1032
residual	195	758.7	3.9		
Total	239	1901.3			

4.1.2.2.4 Changes in 'limited understanding' (component 4)

An analysis of voice disability component 4, 'limited understanding', was performed across visits. Table 4.10 shows means and standard deviations of limited understanding across visits.

Table 4.10 Means and standard deviations of 'limited understanding' across visits - ASD group

Voice Disability Component 4	Mean
Initial visit	6.1 (2.2)
Before intervention	5.9 (2.3)
One week post 1st intervention	5.9 (2.0)
Three months post1st intervention	5.2 (2.1)
One week post 2nd intervention	4.7 (1.7)
Three months post 2nd intervention	5.3 (2.2)

Standard deviation in brackets.

A one-factor repeated measures ANOVA (Table 4.11) was performed to examine whether 'limited understanding' changed over time. This indicated significant differences between subjects (F = 7.8; df 39, p<.001) and visits (F = 5.2; df 5, p<.001).

Table 4.11 One-factor repeated measures ANOVA 'limited understanding' (VDQ component 4)

Source	df	Sum of Squares	Mean Square	F-test	p
Between subjects	39	653.9	16.8	7.8	.0001
Within subjects	200	428.3	2.1		
Visits	5	50.8	10.2	5.2	.0001
residual	195	377.5	1.9		
Total	239	1082.2			

In order to examine where these differences occurred, post hoc comparisons (Scheffe) were performed which indicated that visit 1 (initial visit) was significantly different (F= 3.6, p<.05) from visit 4 (one week following first intervention). Visit 2 (before first intervention) was significantly different (F= 2.9, p<.05) from visit 7 (one week following second intervention).

These results indicate that 'limited understanding' decreased significantly at one week following first intervention, as compared with the initial visit. Furthermore, a significant decrease in 'limited understanding' was also noted at one week following second intervention, when compared with 'limited understanding' pre-intervention.

4.1.2.2.5 Changes in 'communication difficulty' (component 5)

An analysis of voice disability component 5, 'communication difficulty', was performed across visits. Table 4.12 shows means and standard deviations of 'communication difficulty' across visits.

Table 4.12 Means and standard deviations of 'communication difficulty' across visits - ASD group

Voice Disability Component 5	Mean
Initial visit	12.2 (2.3)
Before intervention	12.1 (2.3)
One week post 1st intervention	11.5 (2.2)
Three months post 1st intervention	12.3 (1.5)
One week post 2nd intervention	11.4 (2.1)
Three months post 2nd intervention	11.7 (1.7)

Standard deviation in brackets.

A one-factor repeated measures ANOVA (Table 4.13) was performed to examine whether 'communication difficulty' changed over time. This indicated significant differences between subjects (F = 5.3; df 39, p<.001) but not between visits (F = 2.7; df 5, p=.0241).

Table 4.13 One-factor repeated measures ANOVA 'communication difficulty' (VDQ component 5)

Source	df	Sum of Squares	Mean Square	F-test	p
Between subjects	39	514.7	13.2	5.3	.0001
Within subjects	200	501	2.5		
Visits	5	31.9	6.4	2.7	.0241
residual	195	469.1	2.4		
Total	239	1015.7			

4.1.3 Changes in Psychological Well-Being

4.1.3.1 Changes in Depression

Depression in the ASD group was assessed on five occasions: before intervention, one week and three months following first intervention, and one week and three months following second intervention. ASD subjects were assessed at these time points in order to evaluate both acute and long term effects of the two Botox injections and their impact.

Table 4.14 shows mean depression ratings across visits in ASD subjects.

Table 4.14 Means and standard deviations of depression scores across visits - ASD group

ASD	
Beck	Mean
Before intervention	6.30 (4.36)
One week following first intervention	4.95 (3.96)
Three months following first intervention	5.58 (4.56)
One week following second intervention	5.10 (4.87)
Three months following second intervention	4.38 (4.15)

Standard deviation in brackets.

A one-factor repeated measures ANOVA was performed to examine whether depression changed over time. This indicated significant differences between subjects (F = 98.86, df 39, p<.001), but no significant differences were found between visits (F = 2.06, df 4, p=.088). The results are shown in Table 4.15.

Table 4.15 One-factor repeated measures ANOVA on depression scores

Source	df	Sum of Squares	Mean Square	F-test	p
Between subjects	39	2182.88	55.97	98.86	.0001
Within subjects	1	5533.52	5533.52		
Visits	4	83.43	20.86	2.06	.088
residual	156	1578.17	10.12		
Total	135	2578			

Figure 4.2 shows mean depression across visits for the ASD group.

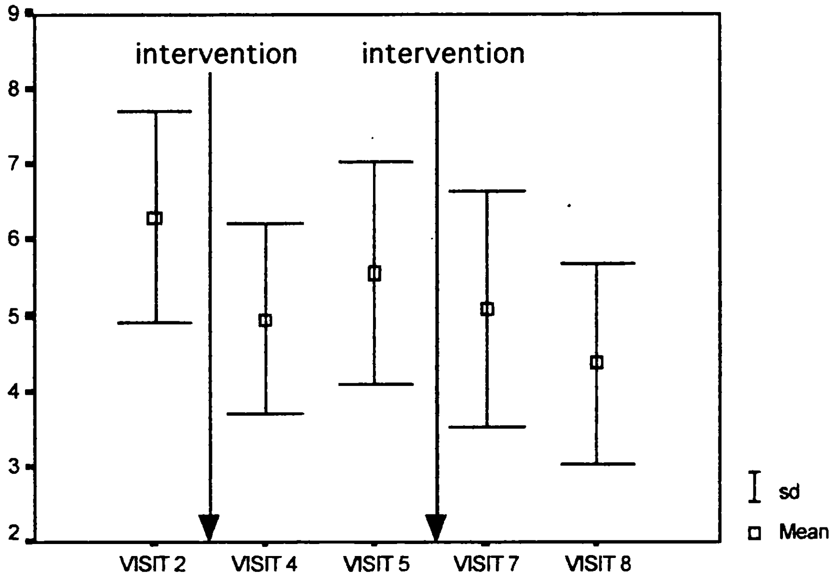


Fig 4.2 Changes in Depression over Time

ASD Group

4.1.3.2 Changes in Anxiety

In order to assess both acute and long term changes in state anxiety resulting from Botox injections, anxiety in the ASD group was assessed on eight occasions: before intervention, immediately before and after first and second interventions, one week and three months following first and second interventions. The results of these analyses are presented herewith.

Table 4.16 shows the means and standard deviation of anxiety scores across visits.

Table 4.16 Means and standard deviations of anxiety scores across visits

Anxiety	Mean
Before first intervention	38.8 (9.9)
Immediately before first intervention	41.5 (12.1)
Immediately after first intervention	38.2 (9.7)
One week following first intervention	34.1 (7.9)
Three months following first intervention	37.9 (11.0)
Immediately before second intervention	39.9 (13.1)
Immediately after second intervention	36.5 (9.6)
Three months following second intervention	35.6 (9.0)

Standard deviation in brackets.

A one- factor repeated measures ANOVA was conducted to examine whether anxiety changed over time. This indicated significant differences between subjects (F = 9.4; df 39, p<.001) and between visits (F = 4.4; df 7, p<.001). The results are shown in Table 4.17.

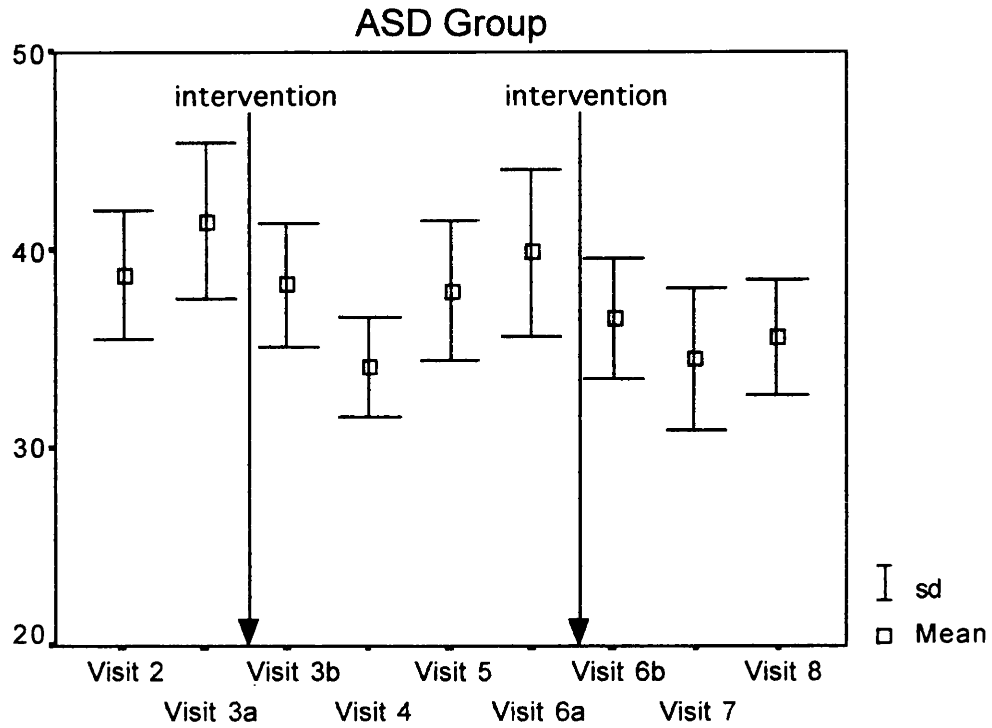
Table 4.17 One-factor repeated measures ANOVA of anxiety scores

Source	df	Sum of Squares	Mean Square	F-test	p
Between subjects	39	20028.2	513.5	9.4	.0001
Within subjects	280	15372.6	54.9		
Visits	7	1560.9	223	4.4	.0001
residual	273	13811.8	50.6		
Total	319	35400.8			

In order to examine where these differences occurred, post hoc comparisons (Scheffe) were conducted. These revealed significant difference (F= 3, p<.05) between visit 3A (immediately before first intervention) and visit 4 (one week following first intervention).

Figure 4.3 shows mean anxiety scores across visits for the ASD group.

Figure 4.3 Changes in Anxiety over Time



4.1.3.3 Changes in Self-Esteem

Self-esteem in the ASD group was assessed on three occasions: before intervention, three months following first intervention and three months following second intervention, in order to assess the impact of the two interventions. The results are presented herewith.

Table 4.18 shows mean self-esteem scores of ASD subjects across visits.

Table 4.18 Means and standard deviations of self-esteem scores across visits - ASD group

Self -esteem	Mean
Before intervention	29.7 (2.3)
Three months following first intervention	30.1 (2.0)
Three months following second intervention	28.6 (1.4)

Standard deviation in brackets.

A one-factor repeated measures ANOVA was performed to examine whether self-esteem changed over time. This indicated significant differences between visits (F = 11.2; df 2, p<.001). The results are shown in Table 4.19.

Table 4.19 One-factor repeated measures ANOVA of self-esteem scores

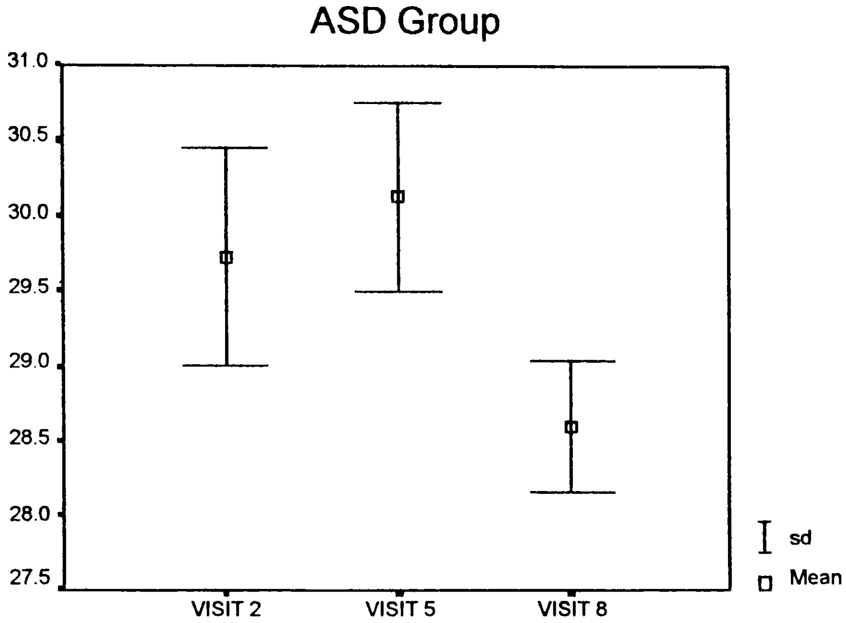
Source	df	Sum of Squares	Mean Square	F-test	p
Between subjects	39	246	6.3	2.3	.011
Within subjects	80	224	2.8		
Visits	2	50	25	11.2	.0001
residual	78	174	2.2		
Total	119	470			

In order to examine where these differences occurred, post hoc comparisons (Scheffe) were performed which indicated that visit 2 (before intervention) was significantly different (F= 5.7, p<.05) from visit 8 (three months following second intervention), and visit 5 (three months following first intervention) was significantly different (F= 10.4, p<.05) from visit 8 (three months following second intervention).

The results show that self-esteem was significantly higher three months following second intervention, when compared with self-esteem before intervention. Furthermore, self-esteem at three months following second intervention was significantly higher than three months following first intervention.

Figure 4.4 shows mean self-esteem across visits for the ASD group.

Fig 4.4 Changes in Self-Esteem over Time


ASD Group

4.1.4 Changes in Coping

Coping in the ASD group was examined by means of a principle component analysis (PCA) and a cluster analysis. The two methods differ in the following ways; the PCA analyses coping dimensions, whereas the cluster analysis describes the whole range of coping as used by individuals. The results are described herewith.

4.1.4.1 Structure of the Voice Impairment Coping Questionnaire-Principle Component Analysis

A principle component analysis was applied to items in the Voice Impairment Coping Questionnaire to determine its structure. The analysis, which is described in detail in a previous section (refer to section 3.23) produced five components: 'physical avoidance', 'information seeking', 'social comparison/distraction', 'finding new meaning' and 'religion/wishful thinking'.

4.1.4.1.1 Changes in coping over time in the ASD group

Coping was measured three times in the ASD group: before intervention and three months following first and second interventions. Table 4.20 shows mean coping component scores, as defined by principal component analysis, for the ASD group, across these visits.

Table 4.20 Mean scores and standard deviations of coping components defined by principal component analysis across visits

	Pre-intervention (visit 2)	**3 months post 1st intervention (visit 5)**	**3 months post 2nd intervention (visit 8)**
Physical avoidance	13.4 (3.8)	12.4 (4.1)	12.1 (3.6)
Information seeking	11.7 (3.8)	11.4 (3.5)	11.9 (3.9)
Social comparison/ distraction	7.3 (2.4)	6.8 (2.4)	6.7 (2.4)
Finding new meaning	11.8 (4.3)	11.7 (4.0)	11.9 (3.9)
Religion/ wishful thinking	6.1 (2.9)	5.9 (2.6)	5.8 (2.7)

Standard deviation in brackets
Intervention occurred at visits 3 and 6.

A one-factor repeated measures ANOVA was conducted on each component to examine changes over time. Table 4.21 shows the ANOVA results for ‘physical avoidance’ (component 1).

Table 4.21 One-factor repeated measures ANOVA 'physical avoidance'

Source	df	Sum of Squares	Mean Square	F-test	p
Between subjects	38	1401.9	36.9	9.3	.0001
Within subjects	78	308	3.9		
treatments	2	36.9	18.5	5.2	.0078
residual	76	271.1	3.6		
Total	116	1709.0			

As can be seen in Table 4.21, significant differences in 'physical avoidance' were found between subjects (F = 9.3; df38; p<.0001), as well as between visits (F= 2; df2, p<.007). In order to examine where these differences occurred, post hoc comparisons (Scheffe) were performed, which indicated that 'physical avoidance' at visit 2 (the pre intervention visit), was significantly different (F= 4.7, p<.05) from visit 8 (three months following second intervention).

Table 4.22 shows the ANOVA results for ' information seeking' (component 2).

Table 4.22 One-factor repeated measures ANOVA 'information seeking'

Source	df	Sum of Squares	Mean Square	F-test	p
Between subjects	39	1331.3	34.1	8.7	.0001
Within subjects	80	314.7	3.9		
treatments	2	4.1	2	.5	.6021
residual	78	310.6	4		
Total	119	1646			

As can be seen in Table 4.22, significant differences in 'information seeking' were found between subjects (F = 8.7; df39; p<.0001). However, no significant differences were found between visits (F= .5; df2, p= .6021).

Table 4.23 shows the ANOVA results for 'social comparison/distraction' (component 3).

Table 4.23 One-factor repeated measures ANOVA 'social comparison/distraction'

Source	df	Sum of Squares	Mean Square	F-test	p
Between subjects	39	509	13.1	6.2	.0001
Within subjects	80	169.3	2.1		
treatments	2	8.2	4.1	2	.1461
residual	78	161.2	2.1		
Total	119	678.3			

As can be seen in Table 4.23, significant differences in 'social comparison/distraction' were found between subjects (F = 6.2; df39; p<.0001). However, no significant differences were found between visits (F= 2; df2, p= .1461).

Table 4.24 shows the ANOVA results for 'finding new meaning' (component 4).

Table 4.24 One-factor repeated measures ANOVA 'finding new meaning'

Source	df	Sum of Squares	Mean Square	F-test	p
Between subjects	39	1625.9	41.7	11.1	.0001
Within subjects	80	299.3	3.7		
treatments	2	1	.5	.1	.8719
residual	78	298.3	3.8		
Total	119	1925.2			

As can be seen in Table 4.24, significant differences in 'finding new meaning' were found between subjects (F= 11.1; df39; p<.0001). However, no significant differences were found between visits (F= .1; df2, p= .8719).

Table 4.25 shows the ANOVA results for 'religion/wishful thinking' (component 5).

Table 4.25 One-factor repeated measures ANOVA 'religion/wishful thinking'

Source	df	Sum of Squares	Mean Square	F-test	p
Between subjects	38	771.4	20.3	15.9	.0001
Within subjects	78	99.3	1.3		
treatments	2	1.6	.8	.6	.5417
residual	76	97.7	1.3		
Total	116	870.8			

As can be seen in Table 4.25, significant differences in 'religion/wishful thinking' were found between subjects (F = 15.9; df38; p<.0001). However, no significant differences were found between visits (F= .6; df2, p= .5417).

In summary, analysis revealed that the only coping component that changed significantly over time was 'physical avoidance' (component 1).

4.1.4.1.2 Identifying different coping groups in ASD subjects- Cluster analysis

Cluster analysis was used in this study in order to group individual subjects on the basis of the size and pattern of their responses to the Voice Impairment Coping Questionnaire. The analysis considered the coping strategies used by the individual, as well as the extent to which other possible coping strategies are not utilised. Three hierarchical methods were used in this study; average linkage between groups (Figure 4.5), single linkage (Figure 4.6) and the Ward's method (Figure 4.7), with the aim of obtaining an appropriate number of groups that gave the best solution. In absence of a standard statistical or theoretical method to determine the 'best' set of derived clusters, the decision on the most appropriate number of clusters was based on the examination of the fusion coefficient, the numerical value at which various cases merge to form a cluster, by identifying a significant "jump" in the value of the coefficient. A "jump" indicated the merger of dissimilar entities, thus identifying different clusters. Examination of the fusion coefficients pointed to a three or two group solution. An iterative technique was used with the number of clusters set at both three and two. Results from the two analyses were compared. The selection of a two or three group solution did not affect the group with the largest discrepancies in coping, who clustered tightly together whichever solution was adopted. The two group solution was selected for further analysis as the optimum solution, as the reduction from the three group to the two group solution resulted in one small group of subjects being subsumed within another.

Fig 4.5 Coping clusters (average linkage between groups) - ASD subjects

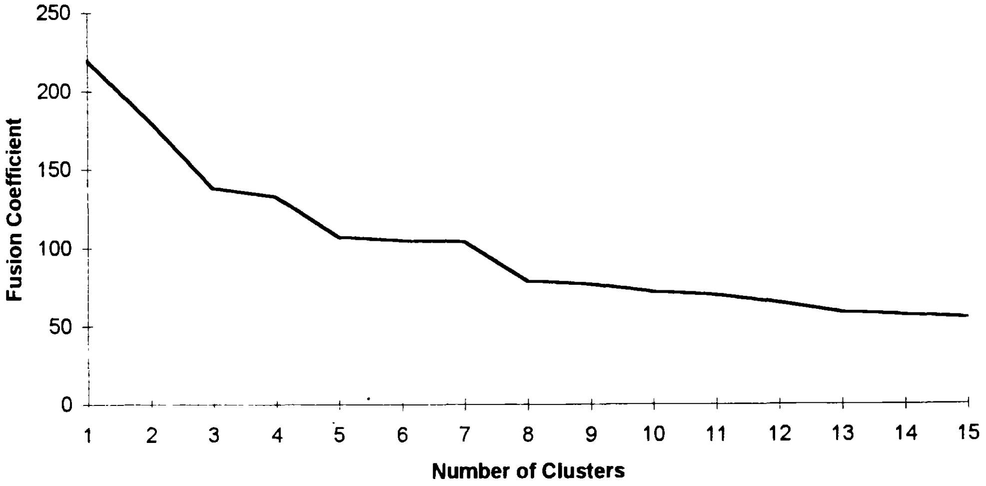


Fig 4.6 Coping clusters (single linkage) - ASD subjects

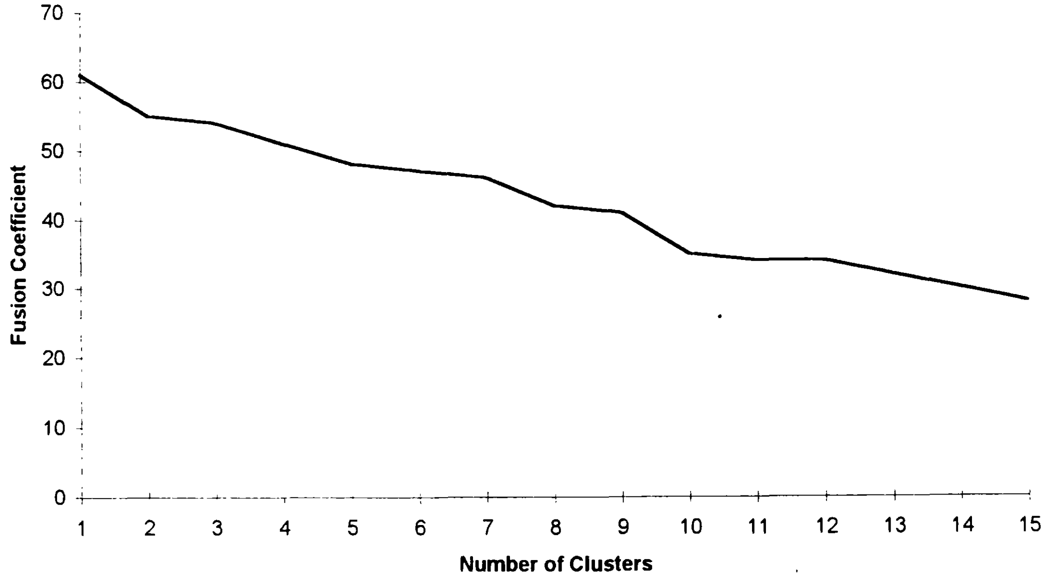
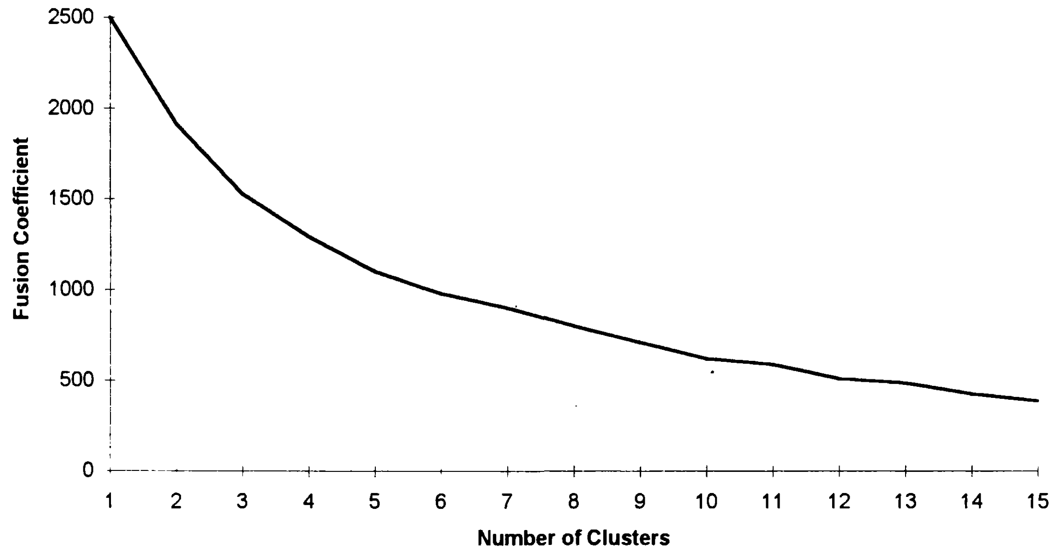


Fig 4.7 Coping clusters (Ward Method) - ASD subjects



Unrelated t-tests were performed to compare the means of coping components in the two coping groups derived from cluster analysis. The results indicated significant differences between the two coping groups in three components: 'information seeking', 'social comparison/distraction' and 'finding new meaning' (Table 4.26).

Table 4.26. t-tests comparing coping components in the two coping groups derived from cluster analysis

Coping Components	Group 1 (n = 19)	Group 2 (n = 21)	t	p 2-tailed
Physical avoidance	13.3 (4.2)	13.5 (4.2)	-.255	p=.800
Information seeking	9.1 (2.9)	14.0 (2.9)	-5.37	p<.0001
Social comparison/ distraction	5.7 (1.5)	8.8 (2.1)	-5.51	p<.0001
Finding new meaning	8.6 (2.7)	14.6 (3.4)	-6.14	p<.0001
Religion/wishful thinking	5.5 (3.2)	6.6 (2.7)	-1.14	p=.260

Standard deviation in brackets

As can be seen, subjects in group 1 are less likely to use the coping strategies of 'information seeking', 'social comparison/distraction' and 'finding new meaning'.

4.1.4.1.3 Changes in coping over time in the two ASD groups as defined by cluster analysis

Coping was measured three times in the ASD group: before intervention, three months following first intervention and three months following second intervention.

Table 4.27 shows mean coping component scores for the two coping groups across the following visits: before first intervention (visit 2), three months following first intervention (visit 5), and three months following second intervention (visit 8).

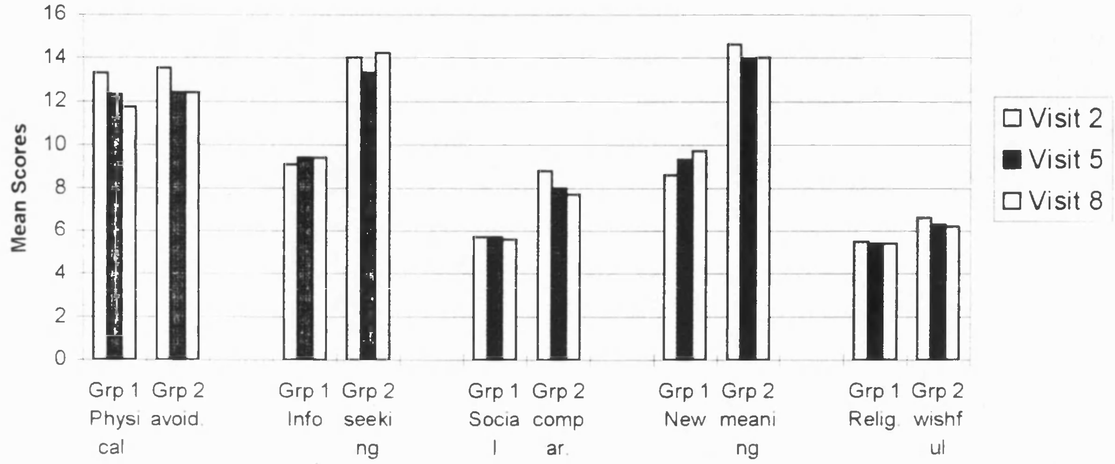
Table 4.27. Mean scores and standard deviations on coping components across visits - two ASD coping groups defined by cluster analysis

		Pre-intervention	**3 months post 1st int.**	**3 months post 2nd int.**
		(Visit 2)	**(Visit 5)**	**(Visit 8)**
Physical avoidance	Group 1	13.3 (4.2)	12.3 (3.9)	11.7 (3.7)
	Group 2	13.5 (4.2)	12.4 (4.3)	12.4 (3.6)
Information seeking	Group 1	9.1 (2.9)	9.4 (2.6)	9.4 (2.6)
	Group 2	14 (2.9)	13.3 (3.2)	14.2 (3.4)
Social comparison/ distraction	Group 1	5.7 (1.5)	5.7 (1.9)	5.6 (1.8)
	Group 2	8.8 (2.1)	8 (2.2)	7.7 (2.4)
Finding new meaning	Group 1	8.6 (2.7)	9.3 (2.8)	9.7 (2.7)
	Group 2	14.6 (3.4)	13.9 (3.7)	14.0 (3.7)
Religion/wishful thinking	Group 1	5.5 (3.2)	5.4 (2.6)	5.4 (2.8)
	Group 2	6.6 (2.7)	6.3 (2.6)	6.2 (2.7)

sd in brackets
Intervention occurred at visits 3 & 6

Figure 4.8 displays the mean scores of coping components in the two coping groups, derived from cluster analysis, before intervention and three months following first and second interventions.

Figure 4.8 Mean Coping Components across Visits
ASD Coping Groups



A two-factor repeated measures ANOVA was carried out on the two coping groups for each coping component to examine changes in coping style across visits. Table 4.28 shows the ANOVA results for 'physical avoidance' (component 1).

Table 4.28 Two-factor repeated measures ANOVA 'physical avoidance'

Source	df	Sum of Squares	Mean Square	F-test	p
Cluster Group	1	3.8	3.8	.1	.7518
subjects w.groups	37	1398.1	37.8		
Repeated Measures	2	36.9	18.5	5.1	.0085
AB	2	2.5	1.2	.3	.7104
Bx subjects w.groups	74	268.6	3.6		

As can be seen in Table 4.28, significant difference was found between visits ($F = 5.1$; df 2; $p < .0085$). However, no significant difference ($F = .1$; df1, $p = .751$) or interaction ($F = .3$; df2, $p = .710$) were found between groups.

Table 4.29 shows the ANOVA results for 'information seeking' (factor 2).

Table 4.29. Two-factor repeated measures ANOVA 'information seeking'

Source	df	Sum of Squares	Mean Square	F-test	p
Cluster Group	1	626.7	626.7	33.8	.0001
subjects w.groups	38	704.6	18.5		
Repeated Measures	2	4.1	2	.5	.6045
AB	2	5.7	2.8	.7	.4967
Bx subjects w.groups	76	304.9	4		

As can be seen, the two-factor repeated measures ANOVA results indicated significant difference between the coping groups (F = 33.8; df 1, p<.001). However, no significant difference between visits (F=.5; df2, p=.496) or interaction (F= .7; df2, p=.496), were found for this component.

Table 4.30 shows the ANOVA results for 'social comparison/distraction' (component 3) in both coping groups.

Table 4.30. Two-factor repeated measures ANOVA 'social comparison/distraction'

Source	df	Sum of Squares	Mean Square	F-test	p
Cluster Group	1	196.7	196.7	23.9	.0001
subjects w.groups	38	312.3	8.2		
Repeated Measures	2	8.2	4.1	2	.1416
AB	2	6.8	3.4	1.7	.1938
Bx subjects w.groups	76	154.4	2		

As can be seen, results revealed significant difference between coping groups (F = 23.9; dfl, p<.001). No significant difference between visits (F=2; df2, p=.141) or interaction (F= 1.7; df2, p=.193) between groups were found for this component.

Table 4.31 shows the ANOVA results for 'finding new meaning' (component 4).

Table 4.31. Two-factor repeated measures ANOVA 'finding new meaning'

Source	df	Sum of Squares	Mean Square	F-test	p
Cluster Group	1	728	728	30.8	.0001
subjects w.groups	38	897.9	23.6		
Repeated Measures	2	1	.5	.1	.868
AB	2	17	8.5	2.3	.1071
Bx subjects w.groups	76	281.3	3.7		

Two-factor repeated measures ANOVA revealed significant difference between coping groups (F = 30.8; df 1, p<.001). No significant difference between visits (F= .1,; df2, p= .868) or interaction between groups (F= 2.3; df2, p=.107), were found for this component.

Table 4.32 shows the two-factor repeated measures ANOVA results for 'religion/wishful thinking' (component 5).

Table 4.32. Two-factor repeated measures ANOVA 'religion/wishful thinking'

Source	df	Sum of Squares	Mean Square	F-test	p
Cluster Group	1	27.1	27.1	1.3	.2531
subjects w.groups	37	744.3	20.1		
Repeated Measures	2	1.6	.8	.6	.5485
AB	2	.6	.3	.2	.8011
Bx subjects w.groups	74	97.2	1.3		

As can be seen, no significant differences were found between groups (F= 1.3; df1, p=.253) or visits (F= .6; df2, p=.548) for this component. No significant interaction was found between groups (F= .2; df2, p=.801).

In summary, analysis revealed significant differences between coping groups in three coping components: 'information seeking', 'social comparison/distraction' and 'finding new meaning'. Thus, subjects in coping group 2 use more information seeking, social comparison/distraction and attempt to find new meaning. The only coping component that changed over time was 'physical avoidance'. However, no significant interaction was found between the two coping groups. The results of the analysis show that both groups did not change in those components that distinguish them, over time.

4.1.5 Changes in Social Support

Social support in the ASD group was measured on three occasions: before intervention, three months following first intervention and three months following second intervention. The rationale for choosing these time points was to assess the impact of both interventions on social support in this group.

Table 4.33 shows the ASD group and the mean and standard deviation of each of the ISSI indices (AVAT, ADAT, AVSI and ADSI). Mean scores of ISSI indices were assessed before first intervention (visit 2), three months following first intervention (visit 5), and three months following second intervention (visit 8).

Table 4.33. Mean ADAT, AVAT, AVSI & ADSI across visits

Social Support	Pre-intervention	Three months post 1st intervention	Three months post 2nd intervention
ADAT	8.10 (2.8)	7.0 (2.9)	7.7 (2.7)
AVAT	6.0 (1.4)	6.0 (2.0)	6.0 (1.4)
AVSI	10.4 (3.1)	9.9 (3.1)	10.0 (3.4)
ADSI	11.4 (4.3)	11.4 (4.3)	11.8 (4.2)

Intervention occurred at visits 3 and 6.

Standard deviation in brackets.

A one-factor repeated measures ANOVA was performed to examine whether adequacy of close attachment changed over time. This showed significant differences between subjects (F = 8.7; df39, p<.001), as well as significant differences between visits (F = 5.6; df 2, p<.005). In order to examine where these differences occurred, post hoc comparisons (Scheffe) were conducted. These indicated that the pre intervention visit (visit 2) was significantly different from visit 5 (three months following first intervention) (F= 5.4, p<.05), in that adequacy of close attachment has decreased three months following first intervention.

A one-factor repeated measures ANOVA was performed to examine the whether adequacy of diffuse relationships changed over time. This showed significant differences between subjects (F = 14.8; df39, p<.001), however, no significant differences were found between visits (F = .7; df2, p=.5245).

A one-factor repeated measures ANOVA was performed to examine whether the availability of close attachment changed over time. This showed significant differences between subjects (F = 9.6; df 39, p<.001), however, no significant differences were found between visits (F = 4.5; df 2, p= .9556).

A one-factor repeated measures ANOVA was performed to examine whether the availability of diffuse relationships changed over time. This showed significant differences between subjects (F = 10.4; df 39, p<.001), however, no significant differences were found between visits (F = 1.2; df 2, p= .2955).

In summary, there was no evidence that social support as assessed by the ISSI changed over time and with intervention, except for adequacy of close attachment, which decreased three months following first intervention.

4.1.6 Changes in Health Locus of Control

Health locus of control was assessed on three occasions in the ASD group: before intervention, and three months following first and second interventions. The rationale for choosing these time points was to assess the impact of both interventions on health locus of control. The results are shown herewith.

Tables 4.34, 4.35 and 4.36 show mean scores and standard deviations of health locus of control indices: 'Internal', 'Chance' and 'Powerful Others' at visit 2 (before intervention), visit 5 (three months following first intervention) and visit 8 (three months following second intervention). Table 4.34 shows mean 'Internal' health locus of control at each visit. As can be seen, there was a slight increase in 'Internal' health locus of control at visit 5, with a decrease at visit 8.

Table 4.34 Means and standard deviations of 'Internal' health locus of control scores across visits

Visit	Mean
Before intervention	22.4 (3.9)
Three months following first intervention	23.7 (3.5)
Three months following second intervention	22.6 (2.9)

Standard deviation in brackets.

A one-factor repeated measures ANOVA was performed to examine whether 'Internal' health locus of control changed over time. This showed significant differences between subjects (F = 3.9; df 39, p<.001). However, no significant differences were found between visits (F = 3.6; df 2, p=.0319).

Table 4.35 shows mean 'Chance' health locus of control ratings at each visit.

Table 4.35. Means and standard deviations of 'Chance' health locus of control scores across visits

Visit	Mean
Before intervention	21 (4.0)
Three months following first intervention	20.2 (4.9)
Three months following second intervention	20.8 (4.7)

Standard deviation in brackets.

A one-factor repeated measures ANOVA was performed to examine whether 'Chance' health locus of control changed over time. This showed significant differences between subjects (F = 5; df 39, p<.001), but no significant differences were found between visits (F = .7; df 2, p=.4899).

Table 4.36 shows mean 'Powerful Others' health locus of control ratings at each visit.

Table 4.36. Means and standard deviations of 'Powerful Others' health locus of control scores across visits

Visit	Mean
Before intervention	18.8 (5.2)
Three months following first intervention	18.0 (5.3)
Three months following second intervention	17.6 (5.8)

Standard deviation in brackets.

A one-factor repeated measures ANOVA was performed to examine whether 'Powerful Others' health locus of control changed over time. This showed significant differences between subjects (F = 5; df 39, p<.001), but no significant differences were found between visits (F = 1; df 2, p=.3646).

In summary, there was no evidence that health locus of control changed over time and with intervention.

4.1.7 Changes in Expectations of Outcome

Expectations of outcome were measured before first and second interventions, in the ASD group.

In order to assess whether the outcome of the first intervention affected subjects' expectations of outcome of second intervention, expectations' scores of the ASD group were compared, by means of related t-tests, on two occasions: prior to first and second injections (visits 2 and 5 respectively). The results shown in Table 4.37 indicate that no significant difference in subjects' expectations was found between the two visits.

Table 4.37. t-tests comparing mean expectations at visit 2 and 5

Criteria	Pre 1st intervention	Pre 2nd intervention	t	p (2-tailed)
Expectations	5.9 (1.01)	5.8 (1.43)	0.37	ns

Standard deviation in brackets.
ns = not significant.

In order to assess whether the intervention had an impact on voice disability, a difference score was obtained, using Voice Disability Questionnaire total score. Two scores were constructed: the first improvement score assessed the difference between the pre intervention score and the short term change following the first intervention (the difference between visits 2 and 4). The second score assessed the difference between pre intervention score and short term change following the second intervention (the difference between visits 5 and 7). Hence, a positive score means that voice disability was reduced and an improvement was obtained. Correlations were then performed between these difference scores and expectations. No significant correlations were found between expectations and improvement in voice disability total scores following first (r= -.0199, p=.861) and second intervention (r = -.1676, p=.301) (Table 4.38).

Pearson's correlations were conducted to examine the relationship between expectations before first and second interventions, and voice disability components, in ASD patients. A difference score was obtained for subjects on voice disability component scores between visit 2 (before intervention) and visit 4 (one week post first intervention), as well as visits 5 (before second intervention) and visit 7 (one week following second intervention). Correlations were then performed between these difference scores and expectations. The only significant correlation found was between difference/improvement score component 4, 'limited understanding', and expectations before second intervention (r = -.393, $p<0.05$ 2-tailed), which indicated that the lower the expectations before second intervention, the bigger the difference/improvement in 'limited understanding', following second intervention. No significant correlations were found between expectations and VDQ components following first intervention. The results are presented in Table 4.38.

Table 4.38. Correlations between expectations and VDQ difference total score and component scores following first and second interventions

Change Scores	Time 1 (Difference visits 2& 4)	Time 2 (Difference visits 5 & 7)
VDQ total score	-.019	-.167
Social isolation	.071	-.166
Negative Communication	-.041	-.141
Public avoidance	.075	.007
Limited understanding	.088	-.393*
Communication difficulty	-.228	.034

*Correlation is significant at the 0.05 level (2-tailed)

The results therefore indicate that improvement in 'limited understanding' (VDQ component 4), following second intervention correlates negatively with pre-intervention expectations.

4.1.8 Changes in Satisfaction with Outcome

Satisfaction with outcome of intervention was assessed on two occasions in the ASD group: one week following first and second interventions. The results are presented below.

In order to assess changes in satisfaction with outcome over time, satisfaction scores of the ASD group were compared, by means of related t-tests, one week following first and second interventions. The results shown in Table 4.39 failed to show a significant difference in subjects' satisfaction between the two visits.

Table 4.39. t-tests comparing mean satisfaction with outcome at visit 4 and 7

Criteria	One week post 1st intervention	One week post 2nd intervention	t	p (2-tailed)
Satisfaction	3.2 (0.3)	3.3 (0.5)	1.2	p=0.2

Standard deviation in brackets.

4.2 FACTORS ASSOCIATED WITH VOICE DISABILITY - CROSS SECTIONAL ANALYSES

The relationships between the Voice Disability Questionnaire and factors associated with predicting voice disability were examined at three time points: prior to intervention and at three months following first and second interventions. Both VDQ total and component scores were used in the analyses. The results are presented herewith.

4.2.1 Psychological Well-Being (Depression, Anxiety and Self-Esteem) and Voice Disability

4.2.1.1 Psychological well-being and voice disability using VDQ total score

Pearson correlations were carried out to examine the relationship between voice disability and depression, anxiety and self-esteem pre and post first and second interventions, in ASD subjects. Results shown in Table 4.40 indicate that no significant correlation was found between psychological well-being (depression, anxiety and self-esteem) and voice disability total score before intervention. However, a significant correlation was found between voice disability and depression three months following first intervention. Furthermore, a significant correlation was also found between voice disability total score, and depression and anxiety three months following second intervention .

Table 4.40 Correlations between voice disability and depression, anxiety and self-esteem before and after first and second interventions

Voice disability	Anxiety	Esteem	Depression
Before first intervention	-.1570	-.2069	.2131
Three months following first intervention	.2320	.0175	.3998**
Three months following second intervention	.4490**	-.1714	.4605**

** Correlation is significant at the 0.01 level (2-tailed).

These results therefore indicate that in subjects with ASD, voice disability significantly correlates with depression, post first and second interventions, and with anxiety, post second intervention . This means that the greater the disability, the greater the depression and anxiety. However, no significant correlation was found between voice disability and self-esteem.

4.2.1.2 Psychological well-being and voice disability using VDQ components

Pearson correlations were carried out to examine the relationship between voice disability components and depression, anxiety and self-esteem pre and post first and second interventions, in ASD subjects. Results shown in Table 4.41 show correlations between depression and VDQ components. As can be seen, a significant correlation was found between 'limited understanding' and depression before intervention. Following first and second interventions, significant correlations were found between 'social isolation', 'negative communication' and 'limited understanding', and depression.

Table 4.41 Correlations between voice disability components and depression before and after first and second interventions

		Depression	
VDQ components	Before intervention	3 months following 1st intervention	3 months following 2nd intervention
Social isolation	.019	.344*	.425**
Negative communication	.269	.325*	.411**
Public avoidance	.089	.255	.174
Limited understanding	.378*	.544**	.462**
Communication difficulty	.050	.022	.237

* Significant at the 0.05 level (2-tailed)
** Significant at the 0.01 level (2-tailed)

Results shown in Table 4.42 show correlations between anxiety and VDQ components. As can be seen, no significant correlations were found between VDQ components and anxiety before intervention. However, a significant correlation was found between 'limited understanding' and anxiety following first intervention. Following second intervention, significant correlations were found between 'social isolation', 'negative communication', 'public avoidance' and 'limited understanding', and anxiety.

Table 4.42 Correlations between voice disability components and anxiety before and after first and second interventions

	Anxiety		
VDQ components	Before intervention	3 months following 1st intervention	3 months following 2nd intervention
Social isolation	-.160	.142	.344*
Negative communication	-.136	.132	.345*
Public avoidance	-.143	.303	.428**
Limited understanding	.077	.322*	.419**
Communication difficulty	-.076	.096	.209

* Significant at the 0.05 level (2-tailed)
** Significant at the 0.01 level (2-tailed)

Results shown in Table 4.43 show correlations between self-esteem and VDQ components. As can be seen, a significant negative correlation was found between 'social isolation' and self-esteem before intervention. This means that the greater the social isolation, the lower the self-esteem. Furthermore, a significantly negative correlation was found between 'communication difficulty' and self-esteem following first intervention, which means that the greater the communication difficulty, the lower the self-esteem. However, no significant correlations were found betweeen self-esteem and VDQ components following second intervention.

Table 4.43. Correlations between voice disability components and self-esteem before and after first and second interventions

	Self-esteem		
VDQ components	Before intervention	3 months following 1st intervention	3 months following 2nd intervention
Social isolation	-.428**	-.005	-.194
Negative communication	.106	-.093	-.120
Public avoidance	-.075	.071	-.114
Limited understanding	.236	.170	-.013
Communication difficulty	.073	-.329*	-.141

* Significant at the 0.05 level (2-tailed)
** Significant at the 0.01 level (2-tailed)

4.2.2 Coping and Voice Disability

4.2.2.1 Two coping groups, as defined by cluster analyses, and voice disability using VDQ total score

Table 4.44 shows the mean total voice disability scores and standard deviations at each visit for each coping group.

Table 4.44 Means and standard deviations of voice disability and the two ASD coping groups, defined by cluster analyses, across visits

Group	Voice Disability			
	Pre intervention	One week post 1st intervention	three months post 1st intervention	three months post 2nd intervention
1	59.3 (11.6)	55.1 (14.8)	54.6 (12.3)	51.9 (12.4)
2	59.1 (12.4)	52.1 (13.4)	57.7 (13.4)	53.9 (13.8)

standard deviation in brackets.

A two- factor repeated measures ANOVA was carried out on the two ASD coping groups (Table 4.45). This revealed significant differences between visits (F = 6.7; df 2, p<.002). No significant differences (F= 1.7;df1, p= .989) or interaction (F= 1.9; df2, p= .161) were found between coping groups.

Table 4.45 Two-factor repeated measures ANOVA of VDQ total score by coping groups

Source	df	Sum of Squares	Mean Square	F-test	p
Cluster Group	1	.1	27.1	1.7E-4	.9895
subjects w.groups	38	15824.3	118.4		
Repeated Measures	2	639.3	319.6	6.7	.002
AB	2	177.3	88.7	1.9	.1611
Bx subjects w.groups	76	3602.1	47.4		

4.2.2.2 Two coping groups, as defined by cluster analyses, and voice disability using VDQ components

'Social isolation' - component 1

A two- factor repeated measures ANOVA was carried out on the two ASD coping groups (Table 4.46) in order to examine 'social isolation' over time. This revealed significant differences between visits (F = 8.5; df5, p<.001). However, no significant difference (F=.1; df1, p=.733) or interaction (F= .7; df5, p=.616) were found between coping groups.

Table 4.46 Two-factor repeated measures ANOVA of 'social isolation' score by coping groups

Source	df	Sum of Squares	Mean Square	F-test	p
Cluster Group	1	23.5	23.5	.1	.7336
subjects w.groups	38	7594.5	199.9		
Repeated Measures	5	894	178.8	8.5	.0001
AB	5	74.8	15	.7	.6167
Bx subjects w.groups	190	4002.3	21.1		

'Negative communication' - component 2

A two- factor repeated measures ANOVA was carried out on the two ASD coping groups (Table 4.47) in order to examine whether 'negative communication' changed over time. This revealed significant differences between visits (F = 6.4; df5, p<.001). However, no significant difference (F= .1; df1, p=.705) or interaction (F= .5; df5, p=.799) were found between coping groups.

Table 4.47. Two-factor repeated measures ANOVA of 'negative communication' score by coping groups

Source	df	Sum of Squares	Mean Square	F-test	p
Cluster Group	1	3.4	3.4	.1	.705
subjects w.groups	38	880	23.2		
Repeated Measures	5	113.4	22.7	6.4	.0001
AB	5	8.3	1.7	.5	.7996
Bx subjects w. groups	190	675.6	3.6		

'Public avoidance' - component 3

A two- factor repeated measures ANOVA was carried out on the two ASD coping groups (Table 4.48) in order to examine whether 'public avoidance' changed over time. No significant differences were found between visits (F = 1.8; df5, p=.11). Furthermore, no significant difference (F=.1; df1, p=.767) or interaction (F=.5; df5, p=.936) were found between coping groups.

Table 4.48 Two-factor repeated measures ANOVA of 'public avoidance' score by coping groups

Source	df	Sum of Squares	Mean Square	F-test	p
Cluster Group	1	2.6	2.6	.1	.7673
subjects w.groups	38	1103.9	29		
Repeated Measures	5	36.2	7.2	1.8	.11
AB	5	5.1	1	.3	.9361
Bx subjects w. groups	190	753.6	4		

'Limited understanding' - component 4

A two- factor repeated measures ANOVA was carried out on the two ASD coping groups (Table 4.49) in order to examine whether 'limited understanding' changed over time. This revealed significant differences between visits (F = 5.2; df5, p<.0002). However, no significant difference (F= .3; df1, p=.560) or interaction (F= .9; df5, p=.472) were found between coping groups.

Table 4.49 Two-factor repeated measures ANOVA of 'limited understanding' score by coping groups

Source	df	Sum of Squares	Mean Square	F-test	p
Cluster Group	1	5.9	5.9	.3	.5607
subjects w.groups	38	648	17.1		
Repeated Measures	5	50.8	10.2	5.2	.0002
AB	5	8.9	1.8	.9	.4729
Bx subjects w.groups	190	368.7	1.9		

'Communication difficulty' - component 5

A two- factor repeated measures ANOVA was carried out on the two ASD coping groups (Table 4.50) in order to examine whether 'communication difficulty' changed over time. No significant differences were found between visits (F = 2.7; df5, p=.0232). Furthermore, no significant difference (F= 1.4; df1, p=.242) or interaction (F= 1.3; df5, p=.242) were found between coping groups.

Table 4.50 Two-factor repeated measures ANOVA of 'communication difficulty' score by coping groups

Source	df	Sum of Squares	Mean Square	F-test	p
Cluster Group	1	18.4	18.4	1.4	.2424
subjects w.groups	38	496.3	13.1		
Repeated Measures	5	31.9	6.4	2.7	.0232
AB	5	16	3.2	1.3	.2498
Bx subjects w.groups	190	453.2	2.4		

In summary, no significant difference or interaction were found between coping groups in voice disability components over time.

4.2.3 Social Support and Voice Disability

4.2.3.1 Social support and voice disability using VDQ total score

The relationships between each of the ISSI scales (ADAT, AVAT, AVSI, ADSI) and voice disability total score were examined both before and after intervention by means of correlation. No significant correlations were found at any visit (Table 4.51).

Table 4.51 Correlations between voice disability and social support across visits

Voice disability	ADAT	ADSI	AVAT	AVSI
Before intervention	-.1297	-.1678	-.1034	-.2467
3 mths. post 1st intervention	-.0802	-.1540	-.2426	.0827
Three mths. post 2nd intervention	-.2558	-.3045	-.1054	.1272

4.2.3.2 Social support and voice disability using VDQ components

Pearson's correlations were conducted in order to examine the relationships between each of the ISSI scales and voice disability components before intervention, three months following first intervention and three months following second intervention. The results for visit 2, before intervention, are shown in Table 4.52.

Table 4.52 Correlations between ADAT,ADSI,AVAT,AVSI and voice disability components before intervention

VDQ COMPONENTS	ADAT	ADSI	AVAT	AVSI
Social isolation	-.100	-.137	-.110	-.175
Negative communication	-.334**	-.289	.027	-.109
Public avoidance	.200	.025	.106	.110
Limited understanding	-.202	-.014	-.408*	-.385*
Communication difficulty	.064	.013	.151	-.129

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

As can be seen, a significant correlation was found between 'negative communication' and reduced adequacy of attachment of social support before intervention. A significant correlation was also found between 'limited understanding' and reduced availability of social support and attachment, before intervention.

The relationships between social support indices and voice disability components at visit 5, three months following first intervention are shown in Table 4.53.

Table 4.53. Correlations between ADAT,ADSI,AVAT,AVSI and voice disability components three months following first intervention

VDQ COMPONENTS	ADAT	ADSI	AVAT	AVSI
Social isolation	-.109	-.183	-.239	-.153
Negative communication	-.190	-.232	.239	-.052
Public avoidance	.123	-.022	-.080	-.001
Limited understanding	-.068	-.069	-.335**	-.148
Communication difficulty	.027	.077	.076	.319**

** Correlation is significant at the 0.01 level (2-tailed)

As can be seen, significant correlations were found between 'limited understanding' and reduced availability of close social attachment, as well as between 'communication difficulty' and availability of diffuse social support.

The relationships between social support indices and voice disability components at visit 8, three months following second intervention are shown in Table 4.54.

Table 4.54 Correlations between ADAT,ADSI,AVAT,AVSI and voice disability components three months following second intervention

VDQ COMPONENTS	ADAT	ADSI	AVAT	AVSI
Social isolation	-.299	-.369**	-.101	-.136
Negative communication	-.337**	-.224	-.178	-.155
Public avoidance	.059	-.201	.096	.052
Limited understanding	-.154	-.080	-.243	-.226
Communication difficulty	-.087	-.019	.034	.020

** Correlation is significant at the 0.01 level (2-tailed)

As can be seen, a significant correlation was found between 'negative communication' and reduced adequacy of attachment and between 'social isolation' and reduction in perceived adequacy of diffuse relationships.

4.2.4 Health Locus of Control and Voice Disability

4.2.4.1 Health locus of control and voice disability using VDQ total and component scores

Pearson correlations were carried out to examine the relationship between voice disability total score, as well as VDQ components, and health locus of control pre and post first and second interventions. The results are presented in Tables 4.55, 4.56 and 4.57. As can be seen, no significant relationships between health locus of control and voice disability total score were found at these time points. Analyses of VDQ component scores and health locus of control revealed a significant correlation between 'Powerful Others' health locus of control, and 'limited understanding' (VDQ component 4) before intervention. No significant correlations were found between health locus of control and VDQ components after first intervention. However, a significant correlation was found between 'Powerful Others' health locus of control and 'social isolation', three months following second intervention. The results are presented herewith.

Table 4.55 Correlations between Internal, Chance and Powerful Others health locus of control, and VDQ total and component scores before intervention

	Before intervention		
VDQ	Internal	Chance	Powerful Others
Total score	.110	-.062	.043
Social isolation	-.045	-.073	-.140
Negative communication	.227	-.155	.060
Public avoidance	.088	-.160	.056
Limited understanding	.287	.261	.350*
Communication difficulty	-.018	-.129	.134

*Significant at the 0.05 level (2-tailed)

Table 4.56 Correlations between Internal, Chance and Powerful Others health locus of control, and VDQ total and component scores three months following first intervention

	Following first intervention		
VDQ	Internal	Chance	Powerful Others
Total score	.094	.296	.169
Social isolation	.025	-.128	.232
Negative communication	.147	.013	-.072
Public avoidance	.112	-.232	.108
Limited understanding	.042	.084	.257
Communication difficulty	-.018	-.167	-.138

Table 4.57 Correlations between Internal, Chance and Powerful Others health locus of control, and VDQ total and component scores three months following second intervention

	Following second intervention		
VDQ	Internal	Chance	Powerful Others
Total score	-.015	.109	.265
Social isolation	-.037	.044	.351*
Negative communication	.086	.140	.158
Public avoidance	-.099	.095	.097
Limited understanding	-.116	.289	.186
Communication difficulty	.195	-.117	-.072

*Significant at the 0.05 level (2-tailed)

4.2.5 Expectations and Voice Disability

Expectations of outcome in ASD subjects were measured on two occasions: before first and second interventions.

4.2.5.1 Expectations and voice disability using VDQ total score

Pearson's correlations were conducted to examine the relationship between expectations of outcome before first and second interventions, and voice disability total score, in ASD subjects (Table 4.58). As can be seen, no significant correlation was found between VDQ total score and expectations before the first intervention. However, a significant correlation was found between expectations of outcome and VDQ total score before second intervention.

4.2.5.2 Expectations and voice disability using VDQ components

Pearson's correlations were conducted between voice disability component scores and expectations before first and second intervention. Results shown in Table 4.58 indicate that no significant correlations were found between voice disability component scores and expectations, before first intervention. However, significant negative correlations were found between expectations of outcome, and 'social isolation', 'negative communication', and 'limited understanding', before second intervention. These results indicate that the greater the social isolation, negative communication and limited understanding, the lower the expectations before second intervention.

Table 4.58. Correlations between expectations and VDQ total score and component scores before first and second interventions

Scores	Visit 2 (Before 1st intervention)	Visit 5 (Before 2nd intervention)
VDQ total score	.066	-.465**
Social isolation	.107	-.404**
Negative Communication	-.160	-.450**
Public avoidance	-.057	-.273
Limited understanding	-.148	-.530**
Communication difficulty	-.269	-.273

* Significant at the 0.05 level (2-tailed)

** Significant at the 0.01 level (2-tailed)

4.2.6 Satisfaction and Voice Disability

Satisfaction with outcome in ASD subjects was measured on two occasions: one week following first and second interventions.

4.2.6.1 Satisfaction and voice disability using VDQ total score

Pearson's correlations between voice disability total score and patient satisfaction post intervention were carried out to test the relationship between these variables. Analysis of data for ASD group failed to show significant relationship between patient satisfaction and voice disability neither following first intervention, nor following second intervention (Table 4.59).

4.2.6.2 Satisfaction and voice disability using VDQ components

Pearson's correlations were conducted between voice disability component scores and satisfaction following first and second intervention. No significant correlations were found (Table 4.59).

Table 4.59 Correlations between satisfaction and VDQ total score and component scores following first and second interventions

Scores	Visit 4 (One week following 1st intervention)	Visit 7 (one week following 2nd intervention)
VDQ total score	.0060	.123
Social isolation	.127	.143
Negative Communication	.140	.195
Public avoidance	-.057	-.073
Limited understanding	-.105	-.071
Communication difficulty	-.048	-.141

4.3 FACTORS ASSOCIATED WITH VOICE DISABILITY BEFORE INTERVENTION- MULTIPLE REGRESSION ANALYSIS

In order to determine which variables accounted for the variance of the total score and the five independent components of voice disability, a series of multiple regression analyses was performed. Variables were included in the multiple regression if they correlated at the point .05 level or better, with the dependent measure.

The order of entry was determined on the basis of the model of the study and the influence of variables on voice disability as described in the literature (see Figure 2.1). Thus, where appropriate, demographic variables (age, sex, marital status) were entered first, followed by duration of symptoms, coping, social support, health locus of control and expectations. Psychological well-being variables: depression, anxiety and self-esteem, were entered at the following step. Finally, voice disability total score and voice disability components were entered. All the multiple regression analyses reported below followed a similar model. The results are presented herewith.

4.3.1 Prediction of Voice Disability Before Intervention

Table 4.60 shows the results of the hierarchical multiple regression analysis, indicating the contributions of variables which accounted for the variance in the total score of the Voice Disability Questionnaire before intervention.

Table 4.60 Hierarchical multiple regression analysis used to account for variance in voice disability total score using measures assessed before intervention in ASD group

Predictor Variables	Adjusted R^2	SE	Beta Weight	p
1. Age			0.15	
2. Sex			-0.17	
3. Marital			0.68	
	-0.04	12.1		NS
4.Symptom duration	-0.07		-0.06	
		12.3		NS
5.Physical avoidance coping (component 1)			0.67	
	0.35	9.5		<0.001
6. Depression			0.21	
7. Anxiety			-0.13	
	0.36	9.4		NS

NS = not significant

As can be seen in Table 4.60, the only variable that contributed significantly to the regression equation was coping component 1, 'physical avoidance', which accounted for 35% of the variance of voice disability before intervention. Demographic variables, symptom duration, depression and anxiety did not add significantly to the regression equation. The final equation accounted for 36% of the variance of voice disability total score before intervention.

4.3.1.1Voice Disability Components

Tables 4.61 to 4.64 show the results of the hierarchical multiple regression analyses, indicating the contributions of variables which accounted for the variance in the Voice Disability Questionnaire components, before intervention.

‘Social isolation’ (component 1)

Table 4.61 Hierarchical multiple regression analysis used to account for variance in ‘social isolation’ (VDQ component 1) using measures assessed before intervention in ASD group

Predictor Variables	Adjusted R^2	SE	Beta Weight	p
1. Age			0.86	
2. Sex			-0.23	
3. Marital			0.04	
	-0.03	7.0		NS
4.Symptom duration			-0.05	
	-0.06	7.15		NS
5. Physical avoidance coping (component 1)			0.59	
	0.27	5.93		<0.01
6. Self-esteem			-0.30	
	0.34	5.63		<0.03
7. Public avoidance (VDQ component 3)			0.45	<0.01
8. limited understanding (VDQ component 4)			0.21	NS
	0.56	4.57		

NS = not significant

As can be seen in Table 4.61, three variables contributed significantly to ‘social isolation’ before intervention: coping through physical avoidance, self-esteem and ‘public avoidance’. ‘Physical avoidance coping’ accounted for 27% of the variance. Self-esteem made a further contribution to ‘social isolation’ before intervention. It contributed 7% to the regression equation. ‘Public avoidance’ (together with ‘limited understanding’) added further 22% to the regression equation. Demographic variables and symptom duration did not add significantly to the regression equation. The final equation accounted for 56% of the variance of ‘social isolation’ before intervention.

'Negative communication' (component 2)

Table 4.62 Hierarchical multiple regression analysis used to account for variance in 'negative communication' (VDQ component 2) using measures assessed before intervention in ASD subjects

Predictor Variables	Adjusted R^2	SE	Beta Weight	p
1. Age			0.04	
2. Sex			-0.68	
3. Marital			0.79	
	-0.07	2.4		NS
4. Symptom duration			0.14	
	-0.10	2.44		NS
5. Physical avoidance coping (Component 1)			0.19	
	-0.10	2.44		NS
6. ADAT			-0.45	
7. ADSI			-0.06	
	0.03	2.28		NS
8. Depression			0.23	
	0.05	2.25		NS
9. Communication difficulty (VDQ component 5)			0.46	
	0.28	1.96		<0.02

NS = not significant

As can be seen in Table 4.62, the only variable that contributed significantly to 'negative communication' before intervention was voice disability component 5, 'communication difficulty', which accounted for 23% of the variance of 'negative communication' before intervention. Demographic variables, symptom duration, 'physical avoidance coping' , depression and adequacy of social support did not add significantly to the regression equation. The final equation accounted for 28% of the variance of 'negative communication' before intervention.

'Public avoidance' (component 3)

Table 4.63 Hierarchical multiple regression analysis used to account for variance in 'public avoidance' (VDQ component 3) using measures assessed before intervention in ASD subjects

Predictor Variables	Adjusted R^2	SE	Beta Weight	p
1. Age			0.06	
2. Sex			-0.06	
3. Marital			0.07	
	-0.06	3.0		NS
4. Symptom duration			-0.11	
	-0.08	3.09		NS
5. Physical avoidance			0.54	
coping (component 1)	0.18	2.69		<0.01
6. Social isolation			0.52	
(VDQ component 1)				
	0.36	2.36		<0.02

NS = not significant

As can be seen in Table 4.63, the variables that contributed significantly to 'public avoidance' before intervention were 'physical avoidance coping' (component 1) which accounted for 18% of the variance, and voice disability component 1, 'social isolation', which accounted for another 18%. Together, they accounted for 36% of the variance of 'public avoidance' before intervention. Demographic variables and symptom duration did not add significantly to the regression equation. The final equation accounted for 36% of the variance of 'public avoidance' before intervention.

'Limited understanding' (component 4)

The results of the hierarchical multiple regression analysis showed that none of the variables made a significant contribution to the regression equation of 'limited understanding' before intervention.

'Communication difficulty' (component 5)

Table 4.64 Hierarchical multiple regression analysis used to account for variance in 'communication difficulty' (VDQ component 5) using measures assessed before intervention in ASD subjects

Predictor Variables	Adjusted R^2	SE	Beta Weight	p
1. Age			0.11	
2. Sex			0.22	
3. Marital			0.04	
	0.01	2.32		NS
4. Symptom duration			0.12	
	-0.01	2.35		NS
5. Negative communication (VDQ component 2)			0.48	<0.02
6. Limited understanding (VDQ component 4)			-0.06	NS
	0.19	2.10		

NS = not significant

As can be seen in Table 4.64, voice disability component 2, 'negative communication', made a significant contribution to the regression equation of 'communication difficulty' before intervention. The final equation accounted for 19% of the variance of 'communication difficulty' before intervention.

4.4 FACTORS ASSOCIATED WITH PSYCHOLOGICAL WELL-BEING-CROSS SECTIONAL ANALYSES

The relationships between depression, anxiety and self-esteem, and factors associated with predicting psychological well-being were examined at three time points: prior to intervention and at three months following first and second interventions. The results are presented herewith.

4.4.1 Depression

4.4.1.1 Coping and depression

Mean scores and standard deviations of depression across visits, for each coping group, are shown in Table 4.65.

Table 4.65 Means and standard deviations of depression and the two coping groups, as defined by cluster analyses, across visits

Group	Depression		
	Before intervention	Three months post 1st intervention	Three months post 2nd intervention
1	7.5 (4.3)	6.8 (4.6)	4.4 (4.3)
2	5.2 (4.2)	4.4 (4.3)	4.4 (4.3)

standard deviation in brackets.

Two- factor repeated measures ANOVA was carried out on the two ASD coping groups to examine whether depressed mood changed over time. The results are shown in Table 4.66.

Table 4.66 Two-factor repeated measures ANOVA of depression scores by the two coping groups, as defined by cluster analyses

Source	df	Sum of Squares	Mean Square	F-test	p
Cluster Group	1	71.5	71.5	1.9	.1723
subjects w.groups	38	1403.7	36.9		
Repeated Measures	2	75.6	37.8	4	.0216
AB	2	36.5	18.2	1.9	.1497
Bx subjects w.groups	76	711.9	9.4		

As can be seen, the results indicated no significant differences between coping groups (F = 1.9; dfl, p=.1723), or across visits (F = 4; df2, p=.0216). Furthermore, no significant interaction was found between groups (F = 1.9; df2, p=.1497).

4.4.1.2 Social support and depression

Pearson correlations were conducted between social support indices and depression scores before intervention (visit 2), three months following first intervention (visit 5) and three months following second intervention (visit 8). The results are shown in Table 4.67.

Table 4.67 Correlations between ADAT, ADSI, AVAT & AVSI and depression - visits 2,5,8 in ASD subjects

Depression scores	ADAT	ADSI	AVAT	AVSI
Before intervention	-.2662	-.1449	-.2013	-.1437
Three mths. post 1st intervention	-.1921	-.0715	-.3888	-.1854
Three mths. post 2nd intervention	-.4506	-.4241	-.4133	-.2146

As can be seen, no significant correlation was found between social support and depression.

4.4.1.3 Health locus of control and depression

Pearson correlations were conducted between heath locus of control indices ('Internal', 'Chance', 'Powerful Others') and depression scores before intervention (visit 2), three months following first intervention (visit 5) and three months following second intervention (visit 8). The results are shown in Table 4.68.

Table 4.68. Correlations between 'Internal', 'Chance' & 'Powerful Others' Health Locus of Control, and depression scores across visits in ASD subjects

Depression scores	Internal	Chance	Powerful Others
Before intervention	.025	-.124	.212
Three moths. post 1st intervention	-.140	.172	.289
Three moths. post 2nd intervention	.286	.026	.456**

** Correlation is significant at the 0.01 level (2-tailed)

As can be seen, a significant correlation was found between depression scores and 'Powerful Others' health locus of control, three months following second intervention.

4.4.1.4 Expectations and depression

Expectations of outcome were measured before first and second interventions. Pearson correlations were conducted between expectations of outcome scores and depression scores, before first intervention (visit 2) and before second intervention (visit 5). The results are shown in Table 4.69.

Table 4.69 Correlations between expectations and depression scores at visits 2 & 5

Depression Scores	Expectations of Outcome
Before 1st intervention	-.231
Before 2nd intervention	-.351*

* Correlation is significant at the 0.05 level (2-tailed)

As can be seen, a significant negative correlation was found between expectations of outcome and depression scores before second intervention, in that the higher the depression score, the lower the expectations.

4.4.1.5 Satisfaction and depression

Satisfaction with outcome was measured on two occasions: one week following first and second interventions. Pearson correlations were conducted between satisfaction with outcome and depression scores one week following first intervention (visit 4), and one week following second intervention (visit 7). The results are presented in Table 4.70.

Table 4.70 Correlations between satisfaction and depression scores at visits 4 & 7

Depression Scores	Satisfaction with Outcome
One week post 1st intervention	-.334*
One week post 2nd intervention	.379

* Correlation is significant at the 0.05 level (2-tailed)

As can be seen, a significant negative correlation was found between satisfaction with outcome and depression scores following first intervention, indicating that the higher the depression score, the lower the satisfaction with outcome. However, no significant correlation was found between satisfaction and depression scores following second intervention.

4.4.2 Anxiety

4.4.2.1 Coping and anxiety

Mean scores of anxiety before intervention, three months following first intervention and three months following second intervention, for each coping group, are shown in Table 4.71.

Table 4.71 Means and standard deviations of anxiety and coping groups, defined by cluster analyses, across visits

Group	Anxiety		
	Before intervention	Three months post 1st intervention	Three months post 2nd intervention
1	38.8 (8.1)	36.6 (7.6)	35.2 (7.3)
2	38.7 (11.4)	39.1 (11.5)	36.0 (10.6)

standard deviation in brackets.

Table 4.72 shows the results of two- factor repeated measures ANOVA which was carried out on the two ASD coping groups.

Table 4.72 Two-factor repeated measures ANOVA of anxiety scores by coping groups, as defined by cluster analyses

Source	df	Sum of Squares	Mean Square	F-test	p
Cluster Group	1	32.6	32.6	.2	.6946
subjects w.groups	38	7910.1	208.2		
Repeated Measures	2	219.8	109.9	2.2	.119
AB	2	34.4	17.2	.3	.7108
Bx subjects w.groups	76	3814.4	50.2		

As can be seen, no significant interaction was found between coping groups (F = .3; df2, p= .7108). No significant differences were found between groups (F = .2; df1, p=.6946) or between visits (F= 2.2; df2, p= .119).

4.4.2.2 Social support and anxiety

The relationships between each of the ISSI scales and state anxiety scores were examined at each assessment visit by means of Pearson's correlations. Results shown in Table 4.73 indicate that no significant correlation was found between ISSI scores and anxiety before intervention, three months after first intervention or three months following second intervention.

Table 4.73 Correlations between ADAT, ADSI, AVAT & AVSI and anxiety visits 2, 5, 8 - ASD subjects

Anxiety scores	ADAT	ADSI	AVAT	AVSI
Before intervention	-.0855	-.1709	-.0040	-.0320
Three mths. post 1st intervention	-.0908	.0050	-.1114	-.0062
Three mths. post 2nd intervention	-.3299	-.3080	-.2175	-.1381

4.4.2.3 Health locus of control and anxiety

Pearson correlations were conducted between heath locus of control indices ('Internal', 'Chance', 'Powerful Others') and anxiety before intervention (visit 2), three months following first intervention (visit 5) and three months following second intervention (visit 8). The results are shown in Table 4.74.

Table 4.74. Correlations between 'Internal', 'Chance' & 'Powerful Others' Health Locus of Control, and anxiety across visits in ASD subjects

Anxiety	Internal	Chance	Powerful Others
Before intervention	-.339*	-.132	-.076
Three moths. post 1st intervention	-.800	.273	.249
Three moths. post 2nd intervention	-.036	.289	.312

* Correlation is significant at the 0.05 level (2-tailed)

As can be seen, a significant negative correlation was found between anxiety and 'Internal' health locus of control before intervention, indicating that the higher the anxiety, the lower the 'Internal' health locus of control.

4.4.2.4 Expectations and anxiety

Pearson correlations were conducted between expectations of outcome scores and anxiety, before first intervention (visit 2) and before second intervention (visit 5). The results are shown in Table 4.75.

Table 4.75 Correlations between expectations and anxiety scores at visits 2 & 5

Anxiety	Expectations of Outcome
Before 1st intervention	-.107
Before 2nd intervention	-.545**

** Correlation is significant at the 0.01 level (2-tailed)

As can be seen, no significant correlation was found between expectations and anxiety before first intervention. However, a significant negative correlation was found between expectations of outcome and anxiety before second intervention, indicating that the higher the anxiety, the lower the expectations.

4.4.2.5 Satisfaction and anxiety

Pearson correlations were conducted between satisfaction with outcome and anxiety one week following first intervention (visit 4), and one week following second intervention (visit 7). No significant correlations were found between satisfaction and anxiety neither one week following first intervention (r=-.282, p= .117), nor one week following second intervention (r=.638, p= .286).

4.4.3 Self-esteem

4.4.3.1 Coping groups and self-esteem

Table 4.76 shows the means and standard deviations of self- esteem across visits for each coping group.

Table 4.76 Mean and standard deviations of self-esteem and coping groups, as defined by cluster analyses, across visits

Group	Self-Esteem		
	Before intervention	Three months post 1st intervention	Three months post 2nd intervention
1	29.6 (2.4)	30.3 (1.6)	28.3 (1.3)
2	29.9 (2.2)	30.0 (2.2)	28.9 (1.4)

standard deviation in brackets.

A two-factor repeated measures ANOVA was carried out on the two ASD coping groups (Table 4.77).

Table 4.77 Two-factor repeated measures ANOVA of self-esteem score by coping groups, as defined by cluster analyses

Source	df	Sum of Squares	Mean Square	F-test	p
Cluster Group	1	.7	.7	.1	.7452
subjects w.groups	38	245.3	6.5		
Repeated Measures	2	50	25	11.2	.0001
AB	2	4.3	2.2	1	.3846
Bx subjects w.groups	76	169.7	2.2		

As can be seen, no significant interaction (F= 1; df2, p=.384) or significant difference (F= .1; df1, p=.745) in self-esteem were found between coping groups. However, significant difference (F= 11.2; df2, p<.0001) was found between visits .

4.4.3.2 Social support and self - esteem

The relationship between each of the ISSI scales and self-esteem scores were examined at each assessment visit by means of Pearson's correlation. The results shown in Table 4.78 indicate no significant correlation between ISSI scales and self - esteem before first intervention, three months following first intervention and three months following second intervention.

Table 4.78 Correlations between ADAT, ADSI, AVAT & AVSI and self-esteem Visits 2, 5, 8 - ASD subjects

Self -esteem scores	ADAT	ADSI	AVAT	AVSI
Before intervention	-.0566	.0097	-.0926	-.0198
Three mths. post 1st intervention	-.0683	-.0553	-.2243	-.0682
Three mths. post 2nd intervention	-.1448	-.0259	-.0984	-.2208

4.4.3.3 Health locus of control and self-esteem

Pearson correlations were conducted between heath locus of control indices ('Internal', 'Chance', 'Powerful Others') and self-esteem before intervention (visit 2), three months following first intervention (visit 5) and three months following second intervention (visit 8). The results are shown in Table 4.79.

Table 4.79 Correlations between Internal, Chance & Powerful Others Health Locus of Control, and self-esteem across visits in ASD subjects

Self-esteem	Internal	Chance	Powerful Others
Before intervention	.222	-.080	.025
Three moths. post 1st intervention	.117	.037	.261
Three moths. post 2nd intervention	.261	.289	.249

As can be seen, no significant correlations were found between self-esteem, and 'Internal', 'Chance' and 'Powerful Others' health locus of control before intervention, and three months following first and second interventions.

4.4.3.4 Expectations and self-esteem

Pearson correlations were conducted between expectations of outcome scores and self-esteem, before first intervention (visit 2) and before second intervention (visit 5). The results are shown in Table 4.80.

Table 4.80 Correlations between expectations and self-esteem at visits 2 & 5

Self-esteem	Expectations of Outcome
Before 1st intervention	-.231
Before 2nd intervention	-.351*

* Correlation is significant at the 0.05 level (2-tailed)

No significant correlation was found between expectations and self-esteem before first intervention. However, a significant negative correlation was found between expectations of outcome and self-esteem before second intervention, indicating that the lower the self-esteem, the higher the expectations.

4.4.3.5 Satisfaction and self-esteem

Satisfaction with outcome was measured on two occasions, at one week following first and second interventions, whereas self-esteem was measured on three occasions, before intervention and three months following first and second interventions. As satisfaction and self-esteem were measured at different time points, it was not possible to assess the relationship between them.

4.5 FACTORS ASSOCIATED WITH PSYCHOLOGICAL WELL-BEING (DEPRESSION, ANXIETY & SELF-ESTEEM), BEFORE INTERVENTION-MULTIPLE REGRESSION ANALYSIS

In order to determine which variables accounted for the variance of depression, anxiety and self-esteem, a series of multiple regression analyses was performed. Variables were included in the multiple regression if they correlated at the point .05 level or better, with the dependent measure.

The order of entry was determined on the basis of the model of the study and the influence of variables on depression, anxiety and self-esteem as described in the literature (see Figure 2.1). Thus, where appropriate, demographic variables (age, sex, marital status) were entered first, followed by duration of symptoms, expectations, coping, social support, health locus of control, voice disability and psychological well-being variables. All the multiple regression analyses reported below followed a similar model. The results are presented herewith .

4.5.1 Prediction of Psychological Well-Being Before Intervention

Table 4.81 shows the results of Pearson correlations between depression, anxiety and self-esteem, and coping, social support, health locus of control, expectations and voice disability before intervention (visit 2).

Table 4.81 Correlations between coping, social support, health locus of control, expectations and voice disability, and depression, anxiety and self-esteem before intervention (visit 2)

Before intervention	Depression	Anxiety	Self-esteem
Coping components			
Physical avoidance	.120	-.140	-.200
Information seeking	-.287*	-.248	-.206
Social comparison/distraction	-.231	-.416*	-.088
Finding new meaning	-.103	-.031	.015
Religion/wishful thinking	.159	.238	.232
Health locus of control			
Internal	.025	-.339*	.222
Chance	-.124	-.132	-.080
Powerful others	.212	-.076	.025
Social support			
ADAT	-.266*	-.206	.364
ADSI	-.145	-.145	.476
AVAT	-.201	-.257	.285
AVSI	-.144	-.144	.452
Expectations	-.107	-.116	-.231
Voice disability			
Total score	.117	-.157	-.157
Social isolation	.018	-.160	-.427*
Negative communication	.268*	-.136	.105
Public avoidance	.808	-.143	-.074
Limited understanding	.377**	.077	.235
Communication difficulty	.049	-.076	.073
Depression		.313*	.207
Anxiety	.313*		.103
Self-esteem	.207	.103	

* p<.05 (2-tailed)

** p<.01 (2-tailed)

4.5.1.1 Depression

Table 4.82 shows the results of the hierarchical multiple regression analysis on depression.

Table 4.82 Hierarchical multiple regression analysis used to account for depression using measures assessed before intervention in ASD subjects

Predictor Variables	Adjusted R^2	SE	Beta Weight	p
1. Age			- 0.22	
2. Sex			0.05	
3. Marital			0.23	
	0.03	4.29		NS
4. Symptom Duration			0.92	
	0.01	4.33		NS
5.Information seeking Coping (component 2)			-0.20	
	0.02	4.31		NS
6.Negative communication (VDQ component 2)			0.23	NS
7. Limited understanding (VDQ component 4)			0.36	0.02
	0.20	3.90		
8. Anxiety			0.24	
	0.23	3.82		NS

NS = not significant

As can be seen, the only variable that contributed significantly to the understanding of depression pre-intervention was voice disability component 4, ‘limited understanding’. The final equation accounted for 23% of the variance of depression before intervention.

4.5.1.2 Anxiety

Table 4.83 shows the results of the hierarchical multiple regression analysis on anxiety.

Table 4.83 Hierarchical multiple regression analysis used to account for anxiety using measures assessed before intervention in ASD subjects

Predictor Variables	Adjusted R^2	SE	Beta Weight	p
1. Age			-0.30	
2. Sex			0.33	
3. Marital			-0.10	
	0.04	9.69		NS
4. Symptom Duration			0.18	
	0.05	9.64		NS
5. Social comparison/ distraction coping (component 3)			-0.34	
	0.15	9.16		0.03
6.Internal HLOC			-0.13	
	0.13	9.21		NS
7. Depression			0.25	
	0.17	9.01		NS

NS = not significant

As can be seen, the only variable that contributed significantly to the understanding of anxiety pre-intervention was 'social comparison/distraction coping', accounting for 10% of the variance. The final equation accounted for 17% of the variance of anxiety before intervention.

4.5.1.3 Self-esteem

Table 4.84 shows the results of the hierarchical multiple regression analysis on self-esteem.

Table 4.84 Hierarchical multiple regression analysis used to account for self-esteem using measures assessed before intervention in ASD subjects

Criterion	Predictor Variables	Adjusted R^2	SE	Beta Weight	p
Self-esteem	1. Age			0.00	
	2. Sex			0.18	
	3. Marital			0.09	
		-0.02	2.28		NS
	4. Symptom Duration			0.19	
		-0.01	2.28		NS
	5. Social isolation (VDQ component 1)			-0.40	
		0.13	2.10		0.01

NS = not significant

As can be seen, the only variable that contributed significantly to the understanding of self-esteem pre-intervention was voice disability component 1, 'social isolation', which accounted for 13% of the variance. The final equation accounted for 13% of the variance of self-esteem before intervention.

4.6 PREDICTION OF THE IMPACT OF INTERVENTION

In order to examine the effects of intervention on voice disability and to identify factors that might predict the likelihood of the intervention being effective, difference scores were calculated for the total voice disability score as well as the five components. These scores were calculated first to examine the acute impact of the intervention by subtracting the one week post intervention scores from the pre-intervention scores (visits 2 and 4, and visits 5 and 7), thus producing two acute scores relating to changes in voice disability following first and second interventions. In addition, the long term effects of voice disability were examined by subtracting the three month scores from each of their respective pre-intervention scores (visits 2 and 5, and visits 5 and 8). These four scores, reflecting changes in voice disability total score, as well as the four scores for each of the five components, were then placed as the dependent measures in a series of hierarchical multiple regression analyses to examine whether the variables identified in the study, and which were found to correlate with these scores, could predict the efficacy of the intervention. The following sections detail these analyses.

4.6.1 Prediction of the Short Term Changes in Voice Disability

4.6.1.1 Short-term changes following first intervention

VDQ total score

The hierarchical multiple regression analysis showed that none of the variables made a significant contribution to the explanation of acute changes in voice disability total scores one week following first intervention.

4.6.1.1.1 Voice Disability Components

'Social isolation' (Component 1)

The results of the hierarchical multiple regression analysis on 'social isolation' are displayed in Table 4.85.

Table 4.85 Hierarchical multiple regression analysis used to account for variance in 'social isolation' difference score visits 2 & 4 using measures assessed before intervention in ASD subjects

Predictor Variables	Adjusted R^2	SE	Beta Weight	p
1. Age			-0.10	
2. Sex			-0.12	
3. Marital			-0.63	
	-0.03	5.80		NS
4. Symptom duration			0.06	
	-0.05	5.87		NS
5. Religion/wishful thinking coping			-0.33	
	0.02	5.64		0.05
6. Powerful others HLOC			-0.22	
	0.03	5.60		NS

NS = not significant
HLOC = health locus of control

As can be seen in Table 4.85, the only variable that made a significant contribution to the explanation of acute results of first intervention expressed in voice disability component 1 scores is 'religion/wishful thinking coping' (component 5) which accounted for 2% of the variance. The final equation accounted for 3% of the variance of the improvement in 'social isolation' one week following first intervention.

'Negative communication' (Component 2)

No significant correlations were found between difference 'negative communication' score visits 2 and 4 (representing acute improvement in 'negative communication' following first intervention) and other variables.

'Public avoidance' (Component 3)

Hierarchical multiple regression analysis results indicated that none of the variables made a significant contribution to the explanation of acute improvement in 'public avoidance' one week following first intervention.

'Limited understanding' (Component 4)

The results of the hierarchical multiple regression analysis on 'limited understanding' are displayed in Table 4.86.

Table 4.86 Hierarchical multiple regression analysis used to account for variance in 'limited understanding' difference score visits 2 & 4 using measures assessed before intervention in ASD subjects

Predictor Variables	Adjusted R^2	SE	Beta Weight	p
1. Age			0.36	0.02
2. Sex			-0.18	NS
3. Marital			0.36	0.02
	0.15	1.77		
4. Symptom duration			0.05	
	0.13	1.80		NS
5. Powerful others			0.16	
HLOC	0.13	1.80		NS

NS = not significant
HLOC = health locus of control

As can be seen in Table 4.86, the only variables that made a significant contribution to the explanation of changes in 'limited understanding' one week following first intervention are age and marital status. The final equation accounted for 13% of the variance of 'limited understanding'.

'Communication difficulty' (Component 5)

No significant correlations were found between difference 'communication difficulty' score visits 2 and 4 and other variables.

4.6.1.2 Short-term changes following second intervention

VDQ total score

The results of the hierarchical multiple regression analysis on voice disability total score are shown in Table 4.87.

Table 4.87 Hierarchical multiple regression analysis used to account for variance in voice disability difference score visits 5 & 7 using measures assessed before second intervention in ASD subjects

Predictor Variables	Adjusted R^2	SE	Beta Weight	p
1. Age			0.13	
2. Sex			-0.09	
3. Marital			0.20	
	-0.03	12.5		NS
4. Symptom duration			-0.04	
	-0.05	12.6		NS
5. Finding new meaning			0.21	NS
coping			0.34	0.05
6. Religion/wishful thinking coping				
	0.11	11.5		
9. Chance HLOC			-0.29	
	0.17	11.1		NS

NS = not significant

HLOC = health locus of control

As can be seen, the only variable that contributed significantly to the variance of voice disability total score one week following second intervention, was 'religion/wishful thinking coping' (component 5), accounting for 11% of the variance (together with 'finding new meaning coping'). The final equation accounted for 17% of the variance of acute changes in voice disability total score one week following second intervention.

4.6.1.2.1 Voice Disability Components

'Social isolation' (Component 1)

The results of the hierarchical multiple regression analysis on 'social isolation' are displayed in Table 4.88.

Table 4.88 Hierarchical multiple regression analysis used to account for 'social isolation' (voice disability component 1) difference score visits 5 & 7 using measures assessed before second intervention in ASD subjects

Predictor Variables	Adjusted R^2	SE	Beta Weight	p
1. Age			0.13	
2. Sex			-0.07	
3. Marital			0.14	
	-0.04	6.57		NS
4. Symptom duration			-0.02	
	-0.07	6.66		NS
5. Chance HLOC			-0.36	
	0.03	6.30		0.03

NS = not significant

HLOC = health locus of control

The results shown in Table 4.88 indicate that the only variable that contributed significantly to the regression equation was 'Chance' health locus of control, accounting for 3% of the variance. The final equation accounted for 3% of the variance in 'social isolation' one week following second intervention.

'Negative communication' (Component 2)

The results of the hierarchical multiple regression analysis indicated that none of the variables contributed significantly to the equation regression.

'Public avoidance' (Component 3)

The summary of the results of the hierarchical multiple regression analysis on 'public avoidance' is displayed in Table 4.89.

Table 4.89 Hierarchical multiple regression analysis used to account for 'public avoidance' (voice disability component 3) difference score visits 5 & 7 using measures assessed before second intervention in ASD subjects

Predictor Variables	Adjusted R^2	SE	Beta Weight	p
1. Age			0.04	
2. Sex			-0.03	
3. Marital			0.23	
	-0.02	2.41		NS
4. Symptom duration			0.14	
	-0.03	2.42		NS
5. Finding new meaning coping			0.24	
6. Religion/wishful thinking coping			0.20	
	0.05	2.31		NS
7. Chance HLOC			-0.40	
	0.19	2.14		0.01

NS = not significant
HLOC = health locus of control

The only variable that contributed significantly to the regression equation was 'Chance' health locus of control which contributed 14% to the variance. The final equation accounted for 19% of the variance of 'public avoidance' one week following second intervention.

Limited understanding (Component 4)

The summary of the results of the hierarchical multiple regression analysis on 'limited understanding' is displayed in Table 4.90.

Table 4.90 Hierarchical multiple regression analysis used to account for 'limited understanding' (voice disability component 4) difference score visits 5 & 7 using measures assessed before second intervention in ASD subjects

Predictor Variables	Adjusted R^2	SE	Beta Weight	p
1. Age			0.12	
2. Sex			0.04	
3. Marital			0.22	
	-0.00	1.75		NS
4. Symptom duration			-0.03	
	-0.02	1.77		NS
5. Finding new meaning			0.32	NS
6. Social comparison/ distraction			0.13	NS
7. Religion/wishful thinking			-0.02	<0.05
8. Information seeking			0.57	NS
	0.40	1.35		
9. Expectations			- 0.15	
	0.40	1.35		NS

NS = not significant

As can be seen, the only variable that contributed significantly to the regression equation is 'religion/wishful thinking coping' (component 5). The final equation accounted for 40% of the variance of 'limited understanding' one week following second intervention.

'Communication difficulty' (Component 5)

The results of the hierarchical multiple regression analysis indicated that none of the variables contributed significantly to the regression equation.

4.6.1.3 Prediction of Second Intervention Short-Term Outcome from First Intervention Short-Term Outcome

VDQ total score

The results of the hierarchical multiple regression analysis indicating the contribution of variables measured one week following first intervention, to the understanding of acute results of second intervention, using Voice Disability Questionnaire total score are presented in Table 4.91.

Table 4.91 Hierarchical multiple regression analysis used to account for voice disability difference score visits 5 & 7 using measures assessed one week following first intervention in ASD subjects

Predictor Variables	Adjusted R^2	SE	Beta Weight	p
1. Age			0.13	
2. Sex			-0.09	
3. Marital			0.20	
	-0.03	12.51		NS
4. Symptom Duration			-0.04	
	-0.05	12.67		NS
5. Public avoidance			0.08	NS
6. Limited understanding			0.51	<0.05
	0.18	11.0		

NS = not significant

As can be seen, voice disability component 4, 'limited understanding', contributed significantly to the regression equation, accounting for 18% of the variance (together with public avoidance). The final equation accounted for 18% of the variance of voice disability total score one week following second intervention.

4.6.1.3.1 Voice disability components

'Social isolation' (Component 1)

The results of the hierarchical multiple regression analysis on 'social isolation' are displayed in Table 4.92.

Table 4.92 Hierarchical regression analysis used to account for 'social isolation' (voice disability component 1) difference score visits 5 & 7 using measures assessed one week following first intervention in ASD subjects

Predictor Variables	Adjusted R^2	SE	Beta Weight	p
1. Age			0.13	
2. Sex			-0.07	
3. Marital			0.14	
	-0.04	6.57		NS
4. Symptom Duration			-0.02	
	-0.07	6.66		NS
5. Difference score limited understanding (Component 4) visits 2 & 4			-0.48	
	0.09	6.10		<0.01

NS = not significant
F = factor

As can be seen, analysis results showed that the only variable that contributed significantly to the explanation of short-term changes in 'social isolation' following second intervention from short-term results of first intervention, was the acute change in 'limited understanding' following first intervention, accounting for 9% of the variance. The final equation accounted for 9% of the variance in 'social isolation', one week following second intervention.

'Negative communication' (Component 2)

No significant correlations were found between 'negative communication' (component 2) difference score visits 5 & 7 and variables at visit 4.

' Public avoidance' (Component 3)

No significant correlations were found between 'public·avoidance' (component 3) difference score visits 5 & 7 and variables at visit 4.

'Limited understanding' (Component 4)

The results of the hierarchical multiple regression analysis indicated that none of the variables contributed significantly to the regression equation.

'Communication difficulty' (Component 5)

The results of the hierarchical multiple regression analysis on 'communication difficulty' are displayed in Table 4.93.

Table 4.93 Hierarchical multiple regression analysis used to account for 'communication difficulty' (voice disability component 5) difference score visits 5 & 7, using measures assessed one week following first intervention in ASD subjects

Predictor Variables	Adjusted R^2	SE	Beta Weight	p
1. Age			0.06	
2. Sex			-0.24	
3. Marital			0.13	
	-0.02	1.89		NS
4. Symptom Duration			-0.16	
	-0.02	1.89		NS
5. Depression			-0.34	
	0.06	1.80		0.04
6. Difference score visits 2 & 4 communication difficulty			0.18	
	0.07	1.79		NS

NS = not significant

As can be seen, analysis results showed that the only variable that contributed significantly to the explanation of acute changes in 'communication difficulty' following second intervention from acute results of first intervention, was the acute change in depression following first intervention, accounting for 6% of the variance. The final equation accounted for 7% of the variance in 'communication difficulty' one week following second intervention.

4.6.2 Prediction of the Long Term Changes in Voice Disability

4.6.2.1 Long term changes in voice disability following first intervention

Voice disability total score

The results of the hierarchical multiple regression analysis on voice disability total score three months following first intervention are shown in Table 4.94.

Table 4.94 Hierarchical multiple regression analysis used to account for voice disability difference score visits 2 & 5 using measures assessed before intervention in ASD subjects

Predictor Variables	Adjusted R^2	SE	Beta Weight	p
1. Age			-0.52	
2. Sex			-0.33	
3. Marital			0.11	
	-0.05	8.84		NS
4. Symptom duration			0.01	
	0.02	8.96		NS
5. Information seeking			-0.22	NS
6. Religion/wishful thinking			-0.47	<0.01
	0.22	7.98		

NS = not significant.

As can be seen in Table 4.94, the only variable that made a significant contribution to the explanation of long term changes in voice disability, expressed in voice disability total score, was 'religion/wishful thinking coping' (component 5) which contributed 20% to the regression equation. The final equation accounted for 22% of the variance of voice disability total score three months following first intervention.

4.6.2.1.1 Voice disability components

'Social isolation' (Component 1)

The results of the hierarchical multiple regression analysis on 'social isolation' are displayed in Table 4.95.

Table 4.95 Hierarchical multiple regression analysis used to account for 'social isolation' (voice disability component 1) difference score visits 2 & 5 using measures assessed before intervention in ASD subjects

Predictor Variables	Adjusted R^2	SE	Beta Weight	p
1. Age			-0.13	
2. Sex			-0.21	
3. Marital			-0.01	
	0.01	6.21		NS
4. Symptom duration			0.57	
	-0.01	6.29		NS
5.Information seeking coping			-0.12	NS
6. Social comparison/ distraction coping			-0.25	NS
7. Religion/wishful thinking coping			-0.35	0.02
	0.17	5.66		
8. Powerful others HLOC			-0.18	
	0.17	5.66		NS
9. Self-esteem			-0.26	
	0.22	5.51		NS

NS = not significant

HLOC = health locus of control

As can be seen in Table 4.95, the only variable that made a significant contribution to the explanation of long term changes in 'social isolation' was 'religion/wishful thinking coping' (component 5) which contributed 17% to the regression equation.

The final equation accounted for 22% of the variance in the long term changes in 'social isolation', three months following first intervention.

'Negative communication' (Component 2)

The results of the hierarchical multiple regression analysis indicated that none of the variables made a significant contribution to the explanation of long term changes in 'negative communication'.

'Public avoidance' (Component 3), 'Limited understanding' (Component 4) and 'Communication difficulty' (Component 5)

No significant correlations were found between variables and difference component scores visits 2 and 5 for these components.

4.6.2.2 Prediction of long term changes in voice disability following second intervention

The results of the hierarchical multiple regression analyses indicating the contribution of variables measured three months following first intervention (before second intervention), to the understanding of long term results of second intervention, are presented below.

VDQ total score

Hierarchical multiple regression analysis results showed that none of the variables, measured three months following first intervention, made significant contribution to the understanding of voice disability total score, three months following second intervention.

4.6.2.2.1 Voice disability components

'Social isolation' (Component 1)

Hierarchical multiple regression analysis results showed that none of the variables, measured three months following first intervention, made significant contribution to the understanding of 'social isolation', three months following second intervention.

'Negative communication' (Component 2)

Hierarchical multiple regression analysis results showed that none of the variables, measured three months following first intervention, made significant contribution to the understanding of 'negative communication', three months following second intervention.

'Public avoidance' (Component 3)

No significant correlations were found between variables measured three months following first intervention, and difference scores visits 5 & 8 for 'public avoidance'.

'Limited understanding' (Component 4)

Hierarchical multiple regression analysis results showed that none of the variables, measured three months following first intervention, made significant contribution to the regression equation of 'limited understanding', three months following second intervention.

‘Communication difficulty’ (Component 5)

The results of the hierarchical multiple regression analysis on ‘communication difficulty’ are displayed in Table 4.96.

Table 4.96 Hierarchical multiple regression analysis used to account for ‘communication difficulty’ (voice disability component 5) difference score visits 5 & 8, using measures assessed three months following first intervention in ASD subjects

Predictor Variables	Adjusted R^2	SE	Beta Weight	p
1. Age			-0.03	
2. Sex			0.04	
3. Marital			0.13	
	-0.05	1.35		NS
4. Symptom duration			-0.08	
	-0.08	1.36		NS
5. Social Comparison/distraction coping			0.28	NS
6. Finding new meaning coping			0.17	
	0.02	1.29		NS
7. Self-esteem			- 0.36	
	0.13	1.22		0.02

NS = not significant

Analysis results showed that the only variable that contributed significantly to the regression equation was self-esteem, accounting for 11% of the variance. The final equation accounted for 13% of the variance of ‘communication difficulty’ three months following second intervention.

4.6.3 Prediction of Psychological Well-Being

In order to examine the effect of intervention on psychological well-being and to identify the factors that might predict changes in psychological well-being, difference scores were calculated for depression, anxiety and self-esteem. These scores were calculated first to examine the impact of first intervention by subtracting the three month following first intervention scores (visit 5) from the pre-intervention scores (visit 2), thus producing scores relating to changes in psychological well-being following first intervention. In addition, the effect of second intervention on psychological well-being was examined by subtracting the three month following second intervention score (visit 8) from the three month following first intervention score (visit 5). These scores, reflecting changes in depression, anxiety and self-esteem, were then placed as the dependent measures, in a series of hierarchical multiple regression analyses to examine whether variables identified in the study and which were found to correlate significantly with these scores, could predict the effect of intervention on psychological well-being. The following sections detail these analyses.

4.6.3.1 Prediction of Changes in Psychological Well-Being after First Intervention

4.6.3.1.1Depression

No significant correlations were found between depression difference score visits 2 & 5, reflecting changes in depression following first intervention, and variables measured before intervention (visit 2).

Table 4.97 shows the results of Pearson correlations between anxiety and self-esteem difference scores visits 2 & 5, reflecting changes following first intervention, and coping,, health locus of control, social support, expectations and voice disability, measured before intervention (visit 2).

Table 4.97 Correlations between coping, , health locus of control, social support, expectations and voice disability, and anxiety and self-esteem difference scores visits 2 & 5

	Anxiety	Self-esteem
Coping components		
Physical avoidance	.241	.001
Information seeking	.129	-.249
Social comparison/distraction	.339*	.073
Finding new meaning	.215	-.073
Religion/wishful thinking	.112	-.111
Health locus of control		
Internal	.118	.075
Chance	.144	.319*
Powerful others	.380**	.233
Social support		
ADAT	.086	.019
ADSI	.169	-.058
AVAT	-.041	-.138
AVSI	-.156	-.049
Expectations	-.019	.077
Voice disability		
Total score	.139	.096
Social isolation	.026	.178
Negative communication	.173	-.105
Public avoidance	.145	.054
Limited understanding	.078	-.047
Communication difficulty	.267*	-.095
Voice disability difference visits 2 & 4	.178	.370**
Depression	.068	.068
Anxiety		.379*
Self-esteem	.103	

* p<.05 (2-tailed)
** p<.01 (2-tailed)

4.6.3.1.2 Anxiety

The results of the hierarchical multiple regression analysis indicating the contribution of variables measured before intervention, to the understanding of anxiety following first intervention, are presented in Table 4.98.

Table 4.98. Hierarchical multiple regression analysis used to account for anxiety difference score visits 2 & 5 using measures assessed before first intervention in ASD subjects

Predictor Variables	Adjusted R^2	SE	Beta Weight	p
1. Age			-0.08	
2. Sex			-0.27	
3. Marital			0.01	
	0.02	10.2		NS
4. Symptom Duration	0.04	10.1	-0.40	NS
5.Social comparison/ distraction coping (component 3)	0.18	9.37	-0.40	0.01
6.Powerful Others HLOC	0.24	8.99	-0.32	0.05
7. Communication difficulty	0.24	8.99	-0.25	NS

NS = not significant
HLOC = health locus of control

As can be seen, two variables contributed significantly to the understanding of changes in anxiety following first intervention; social comparison/distraction coping which accounted for 14% of the variance, and 'Powerful Others' health locus of control, which contributed additional 6%. The final equation accounted for 24% of the variance of anxiety after first intervention.

4.6.3.1.3 Self-esteem

The results of the hierarchical multiple regression analysis indicating the contribution of variables measured before intervention, to the understanding of self-esteem following first intervention, are presented in Table 4.99.

Table 4.99 Hierarchical multiple regression analysis used to account for self-esteem difference score visits 2 & 5 using measures assessed before first intervention in ASD subjects

Predictor Variables	Adjusted R^2	SE	Beta Weight	p
1. Age			-0.07	
2. Sex			0.19	
3. Marital			-0.00	
	-0.04	2.30		NS
4. Symptom Duration			0.00	
	-0.07	2.33		NS
5. Chance HLOC			-0.34	
	0.00	2.24		0.05
6.Voice disability difference score visits 2 & 4			0.36	
	0.12	2.10		0.02
7. Anxiety			0.16	
	0.13	2.09		
				NS

NS = not significant
HLOC = health locus of control

As can be seen, two variables contributed significantly to the understanding of changes in self-esteem following first intervention; 'Chance' health locus of control, accounting for 7% of the variance, and voice disability difference score visits 2 & 4 (acute outcome of first intervention), accounting for 12% of the variance. The final equation accounted for 13% of the variance in self-esteem following first intervention.

4.6.3.2 Prediction of Changes in Psychological Well-Being Following Second Intervention

4.6.3.2.1 Depression

The results of the hierarchical multiple regression analysis, indicating the contribution of variables measured following first intervention to the understanding of depression following second intervention, showed that none of the variables made a significant contribution to the understanding of changes in depression following second intervention.

4.6.3.2.2 Anxiety

The only variables, measured following first intervention, that correlated significantly with difference anxiety score between visits 5 and 8 were 'finding new meaning coping' (component 4) ($r = .3715$, $p<.05$), voice disability difference score visits 5 & 8 ($r = .267$, $p<.01$) and depression difference score visits 5 & 8 ($r = -.0516$, $p<.05$). The results of the hierarchical multiple regression analysis are presented in Table 4.100.

Table 4.100 Hierarchical multiple regression analysis used to account for anxiety difference score visits 5 & 8 using measures assessed three months following first intervention in ASD subjects

Predictor Variables	Adjusted R^2	SE	Beta Weight	p
1. Age			-0.31	
2. Sex			0.37	
3. Marital			-0.21	
	0.08	8.87		NS
4. Symptom Duration			-0.00	
	0.06	8.99		NS
5. Coping F4 (finding new meaning)			0.24	
	0.09	8.80		NS
6. Voice disability difference score visits 5 & 8			0.53	
	0.35	7.43		<0.01
7. Depression difference score visits 5 & 8			-0.00	
	0.33	7.54		NS

NS = not significant

As can be seen, the only variable that contributed significantly to the understanding of changes in anxiety following second intervention was voice disability difference score visits 5 & 8, accounting for 26% of the variance. The final equation accounted for 33% of the variance of anxiety following second intervention.

4.6.3.2.3 Self-esteem

The only variable, measured following first intervention, that correlated significantly with difference self-esteem score between visits 2 and 8 was voice disability difference score visits 5 & 8, reflecting the long term change in voice disability following second intervention ($r= .453$, $p<.05$). The results of the hierarchical multiple regression analysis showed that none of the variables contributed significantly to the regression equation, which means that it was not possible to predict the change in self-esteem following second intervention, on the basis of variables measured three months following first intervention.

CHAPTER 5 DISCUSSION

The main focus of the current study was adductor spasmodic dysphonia (ASD), and the effect of Botox intervention on this disorder. The choice of a control or comparative group was difficult. However, the researcher chose to use what was hoped to be a useful comparison group of subjects with functional dysphonia (FD), a condition that is more abundant than spasmodic dysphonia.

In the present study, the ASD and FD groups did not differ on age, sex or marital status, although one may have expected them to differ in age, as spasmodic dysphonia is described in the literature as a "middle age" condition (Aronson, 1979; Murry et al., 1996). A significant difference between the two groups was found in length of symptoms. Symptom duration was considerably longer in the ASD group. This is in agreement with other studies (Murry et al., 1996; Woodson et al., 1991) and is attributed to the relative rarity of the condition which frequently results in misdiagnosis. Conversely, functional dysphonia is a more common, acute, condition which is easily diagnosed and treated (Scott et al., 1997).

The marked differences found in this study between the ASD and FD groups concerning symptom length and two of the principal measures used in this study, the VDQ and the Coping With Voice Impairment Questionnaire, which were shown to have a different structure in each group, made it difficult to consider the FD group as an appropriate comparison group in this study. For these reasons, the principal focus of the analyses was using a within-subjects design, with the ASD subjects acting as their own control. Thus, this discussion will focus only on the adductor spasmodic dysphonia group.

The discussion of the results is structured on the basis of the model used in this study (see figure 2.1). The changes over time (following Botox interventions) will be discussed first, followed by the two principal outcome variables, voice disability and psychological well-being.

5.1 CHANGES OVER TIME

Overall, the following section will focus on two key issues. Firstly, how do ASD subjects compare to other populations on the variables in the study, and secondly, do these variables change over time.

5.1.1. Psychological Well-Being

Depression

Before discussing the findings in relation to depression, it is necessary to consider a conceptual issue as to how depression is defined, and to distinguish between clinical depression versus depressed mood. Clinical depression connotes a depression severe enough to warrant medical attention and treatment. Although an interview is required to diagnose clinical depression, in research studies it is frequently made by means of a variety of instruments, including the Beck Depression Inventory (BDI) used in this study, using cut-off points. The term depressed mood refers to transient mood states characterised by unhappiness or sadness which has various degrees of severity. In research on health outcomes, such as the present study, the focus is often on self-reported feelings which are expressed in terms of 'mood', rather than as a clinical state. The Beck Depression Inventory (BDI) was used as a measure of depressed mood in this study. The mean score for depression in the current study was 6.3 (sd 4.3), which is within the range defined in the BDI manual as normal. As none of the scores for depression in the current study were beyond the cut-off point for clinical depression (10 in the BDI), the scores were only treated as continuous measures rather than grouped by severity.

In common with the current study, the evidence of the literature is that, in the main, patients with voice disorders (including spasmodic dysphonia) do not suffer from a major psychiatric condition such as clinical depression (Aronson, 1990a; Butcher et al., 1987; House and Andrews, 1987; Butcher et al., 1993) In contrast, Cannito et al. (1991) reported high levels of depressed mood in 56% of their ASD patient group (mean score 48.4, sd 14, range 33-89), using the Self-rating Depression Scale (SDS) and applying the cut-off point of 40, which was defined in the SDS manual as a borderline region of "high" level of depressed mood (Zung, 1967). The level at which the patient is in need of psychiatric care was defined by Zung (1967) as an SDS score of 50 or above. Cannito et al. (1991) compared the spasmodic dysphonics' scores to a normal control group (mean score 35.9, sd 7.2, range 26-54), and found a significant difference between the two groups. Following Cannito's study (1991), Murry et al. (1994) used the SDS and the same cut-off point of 40 to examine the prediction, based on Cannito's findings (1991), that subjects with spasmodic dysphonia would exhibit elevated depressed mood scores when compared to normal controls. Murry et al. found that their spasmodic dysphonia patients displayed significantly elevated depressed mood scores, compared to a normal control group. However, they pointed out that the median score for the patients categorised as "depressed" in their study was 40 and that "the area for scores between 40 and 50 may be considered only borderline depression" (p.313). Cannito and Murry et al.'s findings suggest that above-normal levels of depressed mood may exist in subjects with spasmodic dysphonia before Botox intervention, compared with a normal control group. Aronson (1968) used the MMPI depression scale on a group of twenty female subjects with spasmodic dysphonia. He found that the level of depressed mood in his spasmodic dysphonia group was "slightly higher in the undesirable or abnormal direction" and concluded that, despite the lack of statistically significant difference compared to female medical outpatient group, "one might infer that there is a slight trend for women with spasmodic dysphonia to be somewhat depressed" (Aronson, 1968, p. 214). The utilisation of different instruments for the diagnosis of clinical depression could explain the discrepancy between the studies which used different measurement instruments (Self-rating Depression Scale used by Cannito et al. and Murry et al. versus the MMPI used by Aronson, and the Beck Depression Inventory used in the current study). Furthermore, the necessity of employing a cut-off means that small changes in actual scores can move subjects across category boundaries, i.e. 'high' versus 'low' levels of depressed mood. For example, in Murry et al.'s study (1994) the authors state that subjects were close to the cut-off and small differences in scores resulted in their inclusion in the 'high' level of depressed mood group. This could perhaps further explain the differences between the different findings. Further studies, using the same measures, are necessary to resolve the discrepancy between this study and others on levels of depressed mood in patients with spasmodic dysphonia. Although there was no evidence of significantly elevated levels of depressed mood in the current study, one cannot rule out the possibility that some individuals with ASD could exhibit high levels of depressed mood, considering their long-term disability.

The results of the current study indicated that there were no significant changes in depressed mood over time. However, there was a trend for depressed mood to decrease at one week following first and second interventions. Cannito et al. (1991) found that patients who exhibited high levels of depressed mood before intervention showed a significant reduction one week following intervention. These results were further supported by Murry et al. (1994), whereas Aronson (1968) did not examine depressed mood in relation to intervention. The results of the current study are in line with Cannito and Murry et al.'s findings, in that they show a trend for depressed mood to decrease at one week following Botox interventions but clearly, the levels could not decline as much as in the other studies, as the scores were low prior to the Botox interventions. These studies offer evidence for a link between Botox intervention for spasmodic dysphonia and psychological well-being which needs to be investigated further on larger patient groups.

Anxiety

As with depression, when referring to anxiety, a differentiation needs to be made between clinical anxiety and anxious mood. Clinical anxiety refers to a state of dysfunctional heightened awareness of real or imagined impending events which requires medical or psychiatric intervention. Anxious mood in the context of this study was viewed as transitory feelings of fear and worry, as opposed to clinical anxiety where the measure was treated as a continuous score.

The current study showed that ASD subjects presented with elevated anxious mood scores before intervention. These results were similar to those reported by other researchers (e.g. Cannito, 1992; Murry et al., 1994). Furthermore, when examining the course of anxious mood over time, it showed similar fluctuations to those reported in other studies on surgical patients (Anderson & Mansur, 1983; Johnston, 1984; Johnston et al., 1980; Kendall & Watson, 1981); high level of anxiety or anxious mood on admission, with a gradual decline in the post operative or post treatment period. The current results indicated a significant increase in anxious mood immediately before the first intervention, with a significant decline one week following intervention and a further decline, three months following intervention. This pattern recurred across the course of second intervention. Similar patterns of anxiety or anxious mood in patients with spasmodic dysphonia have been reported by other researchers (Murry et al., 1994).

These findings raise the question as to the reasons for the fluctuation in anxious mood over time. The simplest explanation which has been adopted by most researchers (Cannito, 1992; Murry et al., 1994) is to relate the anxious mood to the intervention; the reduction of symptoms following intervention in the majority of patients influences their psychological state. It seems logical that the type of intervention used would lead to this course of anxious mood, in particular the rate of decline in the post intervention period. However, it is of interest to note that although this would reflect the group trend, when individual performance was examined, some differences were observed, which suggest that there could be other explanations to anxious mood exhibited by some ASD subjects over time. Some ASD subjects showed only a small decline in anxious mood following intervention. This could possibly indicate that patients switched their concerns to the impact of adductor spasmodic dysphonia on their disability which has been long standing, leading to a fixed and perhaps accommodated pattern of behaviour in relation to their voice disability. For these patients, the relief of their voice symptoms may result in them switching the focus of their anxious mood from the intervention, to its outcome, or their adaptation to having useful voice available. Thus the increase in anxious mood observed in some ASD subjects following intervention could be related to worry about re learning to communicate using their improved voice quality after a long period of voice disability. The relationships between voice disability and anxious mood will be discussed in detail in section 5.2.2.

Self-Esteem

Self-esteem refers to self acceptance and an individual's valuing of himself/herself. To date, self-esteem has not been investigated in relation to spasmodic dysphonia but in general, it has been included in some studies related to chronic illness as an indicator of psychological well-being (Newman et al., 1996). Andrews (1995) argues that low self-esteem is commonly associated with depression, which can either trigger or result from voice disorders. However, the assumption that the absence of high levels of depressed and anxious moods can be equated with positive psychological well-being has been criticised as being naive (Wallston and DeVellis, 1991). It has been argued that positive mood states are not the opposite of negative moods. The results of the current study indicated that self-esteem did not correlate with depressed and anxious moods before intervention, and this provided further justification for examining a positive mood such as self-esteem, in addition to measures of depression and anxiety.

ASD subjects in this study exhibited mean self-esteem scores that indicated high self-esteem, compared with normal population (Rosenberg, 1965). One would perhaps expect a chronic condition like adductor spasmodic dysphonia to generate feelings of powerlessness or worthlessness, expressed in low self-esteem (Rosen & Sataloff, 1997), especially as reduced self-esteem has been reported in relation to other chronic illnesses (Newman et al., 1996; Turk, 1979). It is not possible to compare these results to other findings on spasmodic dysphonia, as no studies to date have included measures of self-esteem in patients with spasmodic dysphonia.

Results of the present study showed significant changes in self-esteem over time although the pattern was not clear. Self-esteem decreased three months following first intervention, while a significant increase in self-esteem was noted three months following second intervention, compared with self-esteem scores before the first intervention. These results imply that although self-esteem remained relatively high, ASD subjects experienced lower self-esteem with return of symptoms at three months following first intervention. However, having been through another intervention, their self-esteem increased significantly compared with their positive mood states before intervention and following first intervention. The present results also indicated that the relationships between self-esteem and depressed mood changed over time, in that self-esteem correlated significantly with depressed mood three months following first intervention, but not before intervention or three months following second intervention. No significant correlations were found between self-esteem and anxious mood following first and second interventions. The changes in the relationships between self-esteem and depressed mood following first intervention is interesting as it shows that ASD subjects exhibited a decrease in positive mood states with return of symptoms following first intervention and at this time, self-esteem correlated significantly with depressed mood. This suggests that a reduction in positive mood states was associated with depressed mood which occurred when the effect of the first Botox intervention began to wear off and symptoms returned. The failure to find similar relationships between self-esteem and depressed mood following second intervention may imply that ASD subjects have adjusted to the pattern of their recurring disability following Botox intervention by the time of the second intervention.

5.1.2. Coping

One of the main aims of this study was to explore the concept of coping and its contribution to disability and psychological well-being. The coping model, based on Lazarus (1991), claims that coping is an intervening process adopted by the individual in response to illness demands which directly affects the psychological, social and physical outcome of medical intervention (see Figure 1.1). Coping was considered particularly interesting in the case of adductor spasmodic dysphonia and Botox intervention, as the demands or stressors on patients are likely to change with intervention, and it was postulated that individuals' coping will need to adapt to new situations resulting from intervention, only to find their symptoms return. Patients with adductor spasmodic dysphonia in this study had a mean length of symptoms of 5.4 years, which for the majority of them, was the time between first onset of symptoms and first intervention.

In the present study, two different statistical techniques were used to assess coping, principal component and cluster analyses. The major difference between the two methods employed is in their application; the principal component analysis is concerned with identifying underlying factors which potentially influence the dependent variable, thus it was used to examine the inherent structure of the **Voice Impairment Coping** Questionnaire. Cluster analysis is concerned with grouping individuals into homogeneous groups on the basis of their performance on the **Voice Impairment Coping** Questionnaire. It was therefore used to identify coping groups based on their performance on the **Voice Impairment Coping Questionnaire**. Given that the principal component analysis classifies coping dimensions whereas the cluster analysis classifies individuals, they were likely to show different results. The findings using the principal component analysis will be discussed below, followed by the cluster analysis.

The principal component analysis for the ASD group revealed five coping components; 'physical avoidance', 'information seeking', 'social comparison/distraction', 'finding new meaning' and 'religion/wishful thinking'. 'Physical avoidance coping' refers to avoiding situations which involve voice use. 'Information seeking' describes problem solving coping through seeking information about the condition. 'Social comparison/distraction coping' describes using others as comparisons or as a means of distraction. 'Finding new meaning coping' refers to cognitive restructuring and 'religion/wishful thinking' refers to the use of prayer , religion or wish fulfilment as a coping strategy.

Recent approaches to coping with chronic illness, based on the transactional model (Lazarus and Folkman, 1984) have been dominated by the distinction between emotion-focused and problem-focused modes of coping. Like the present study, in a number of these studies the coping styles have been defined by factor or principal component analyses. However, it has been acknowledged that it is not always easy to distinguish between emotion and problem-focused coping and that the attempts to force data to place subjects onto these dimensions may lead to a deceptive picture of individuals' overall coping strategies (Newman et al., 1990; Cohen, 1987). In the current study, it was not possible to categorise the components easily into emotion-orientated versus problem-orientated coping.

The only coping component that changed over time in the ASD group was 'physical avoidance'; the use of 'physical avoidance coping' decreased steadily following first and second interventions. It is not unreasonable to expect coping strategies to change over time, especially as this is likely to be related to the impact of intervention. With repeated intervention, individuals may learn that particular strategies are no longer as effective and adjust their coping responses accordingly. It is likely that once ASD subjects experienced normal or near normal voice quality following intervention, they ceased to use physical avoidance as a coping strategy as it was no longer appropriate.

By applying the statistical technique of cluster analysis to the coping data of the ASD group, individuals were grouped on the basis of their overall pattern of coping strategies (Newman et al., 1990). The value of this statistical technique in considering the role of coping is that it does not prejudge the performance of coping along preconceived dimensions, but analyses the position of individuals by considering the pattern of responses on the whole range of items, in this case the **Voice Impairment Coping Questionnaire**, thus, taking into consideration both the use and the non use of specific strategies in any individual's repertoire. Furthermore, the optimum groupings are defined by the statistical process and are uncontaminated by views about outcome. The ASD sample was best clustered into two groups. The two coping groups differed significantly on three components: 'information seeking', 'social comparison/distraction' and 'finding new meaning'. These findings are consistent with other studies on chronic disease, e.g. rheumatoid arthritis, where cluster analysis has been used. Newman et al. (1989) examined a group of patients with rheumatoid arthritis, and used a cluster analytic technique to divide them into four groups who differed in how they attempted to deal with the stresses of arthritis. Their study showed that a high proportion of individuals with rheumatoid arthritis did not show a distinctive coping strategy but tended to use a large range of coping strategies. Similarly, the current results suggest that ASD subjects used a variety of coping strategies rather than the typologies of active versus passive or emotion versus problem-focused coping which appear in much of the coping literature.

When examining changes over time, the results of the present study showed that the two coping groups, identified by cluster analysis, did not change their coping responses over time. A possible explanation for using similar coping responses over time is the long disease duration; ASD patients clearly need some time to adapt to the changes resulting from intervention, before adjusting their coping accordingly. Another explanation for these findings is related to the persisting vocal dysfunction following Botox injections reported in some studies (Woodson et al., 1991; Zwirner et al., 1991; Ford et al., 1992; Cannito et al., 1994), in that the reduction of spasms occurs at the expense of volume and reduced vocal inflection. Thus, patients may still be uncomfortable with these limitations of vocal output that do not allow them to have a completely normal voice, and may therefore perceive that although there has been a change in illness situation, the post-injection voice presents with another illness episode or disability that has to be coped with. It is of course also possible that individuals use and continue to use particular strategies regardless of the demands the illness or symptoms place on them.

5.1.3. Social Support

Social support has been generally viewed as an important moderator of the relationship between stress and illness (Newman et al., 1996). A number of studies have demonstrated the benefits of social support for people coping with chronic illness, in that greater support is associated with better psychological adjustment to the illness, adherence to treatment and mental health (Dimatteo & Hayes, 1981; Kaplan & Toshima, 1990). The social support measure used in this study provided four subscales. These were: AVAT which assessed the availability of close confiding and emotionally intimate relationship; ADAT which assessed the adequacy of and satisfaction with close relationships; AVSI which assessed the availability of more diffuse relationships such as with friends, neighbours and work associates, and; ADSI which assessed the adequacy of and satisfaction with more diffuse relationships. Two issues will be discussed below; social support in ASD subjects in terms of absolute scores in relation to other chronic conditions, as well as changes over time.

Comparison of social support scores of availability and adequacy of close and diffuse relationships, exhibited by ASD subjects, with mean scores of a sample of the general population (Henderson et al., 1980) indicated that the scores exhibited by the ASD subjects did not differ a great deal from the general population scores. Thus, these results suggest that individuals with adductor spasmodic dysphonia do not on the whole perceive themselves to be socially isolated or have insufficient social support. These findings are in agreement with other studies which indicate that most chronically ill persons report having sufficient support available and consider the support to be adequate (De Ridder et al., 1996).

The examination of social support is an important element in the understanding of coping. In the context of the present study, social support has been viewed as a moderator of the relationship between the voice disorder (ASD) and the disability. The nature of spasmodic dysphonia, a long term condition involving periods of relative normality of voice quality resulting from Botox intervention, as well as periods of severe communication difficulty, is likely to affect social support. Theories of support that conceptualise stress as a process suggest that social networks may undergo significant changes in the face of chronic strains such as illness (Pearlin, 1989), which raises a question with regards to the changes in social support over time. The results of the present study indicate that adequacy of close attachment was the only aspect of social support that changed over time, in that it declined significantly three months following first intervention. A possible explanation for these findings is that in the pre-intervention stage, family and friends may rally around the individual. Once voice quality improves and things have normalised, support may decline.

5.1.4. Health Locus of Control

The literature review suggests that health locus of control influences the way in which individuals adjust to their health. A question arises as to whether ASD subjects differ in health locus of control from other populations. Comparison of the mean scores of health locus of control subscales in ASD subjects to other samples of chronic patients, college students and healthy adults, published by Wallston et al. (1978), indicated that ASD subjects are different. However, the pattern of the scores before intervention; high on 'chance' health locus of control and low on both 'internal' and 'powerful others' health locus of control, in relation to the mean scores of normals, was one of the eight 'types' of health locus of control identified by Wallston (1978). ASD subjects exhibited a health locus of control pattern which was thought of as 'pure chance', that is they believed that their health status is determined by chance e.g. fate or luck. Having a 'chance' locus of control orientation has been interpreted by some researchers as feeling helpless (Abramson et al., 1978). They argued that feeling helpless is similar to feeling incompetent and non self-efficacious, which may have significant motivational, emotional and behavioural consequences. Given the length of symptom duration found in the current study (mean length 5.4 years), it is perhaps not surprising that ASD subjects exhibited a 'chance' health locus of control orientation or felt helpless in relation to their long standing disability. Furthermore, locus of control has been found to be a significant factor in patients with voice disorders e.g. vocal nodules, vocal polyps and Reinke's oedema (Moir, 1988), who demonstrate an external locus of control, characterised by beliefs that chance, luck or fate determine their behaviour. However, direct comparisons between the two studies are limited due to the different assessment tools used (the Locus of Control Questionnaire (Rotter, 1966)) was used in Moir's study; the Multidimensional Health Locus of Control Questionnaire (Wallston et al., 1978) was used in the current study) .

The results of this study failed to indicate any significant changes in the three measures of health locus of control over time. This implies that the pattern of control beliefs does not change over time, even with intervention. The role of health locus of control as a predictor of voice disability for long and short term improvement, and the possible implications of these findings on intervention will be discussed under 'Factors Predicting the Impact of Intervention' (refer to section 5.2.4).

5.1.5. Expectations of Outcome

The results of the current study indicated that ASD subjects had high expectations prior to first intervention. These results are in common with other studies, e.g. cardiac patients awaiting heart transplantation (Leedham et al., 1995), who exhibited high positive expectations pre-operatively. It seems quite reasonable that ASD subjects would exhibit high positive expectations before intervention, especially as it was anticipated that the intervention would provide a relief, albeit temporary, from a long-term disability.

Various studies have indicated that expectations are highly influenced by experience (Fitzpatrick et al., 1984), thus expectations prior to second Botox intervention were examined in relation to expectations before first intervention. No significant differences in expectations were found between these two visits. This suggests that the outcome of first intervention may have lived up to patients' expectations and therefore, their expectations of outcome of second intervention remained at the same level. Alternatively, regardless of the outcome of first intervention, high expectations prior to second intervention could reflect patients' aspirations in relation to the desired outcome of Botox intervention. Assuming that they would like the injection to 'work', their expectations remain high.

5.1.6. Satisfaction

Patient satisfaction in the current study was assessed as a means of evaluating outcome of a medical encounter, in this case in relation to Botox intervention. The results of the present study showed a 'high' satisfaction score one week following first intervention, according to the scores defined by Wolf et al. (1978) in the MISS manual. The results therefore imply that ASD subjects considered their episode of care as being successful.

Examination of satisfaction scores over time in relation to second Botox intervention showed a slightly higher score following second intervention, but this was not statistically significant. These results imply that ASD subjects were as satisfied with the outcome of their second patient-provider interaction as they were with the outcome of their first interaction, in relation to Botox intervention. Most of the empirical research on satisfaction with medical care focuses on single first-visit encounters among patients with undiagnosed symptoms or acute illnesses in primary care clinics (Newman et al., 1996). Less research is available on long-term care for patients with chronic illnesses, making it difficult to compare studies to the findings on ASD subjects reported here. Further studies need to be carried out in order to evaluate patients' satisfaction with care over time, especially in this and other patient groups, where intervention is repeated on a regular basis.

5.2 VOICE DISABILITY

The following section will focus on the concept of voice disability. The section begins by discussing voice disability within the context of the World Health Organisation health model of impairment, disability and handicap, and then turns to the assessment of voice disability and a discussion of factors associated with voice disability. The section concludes with an evaluation of the impact of intervention and the factors associated with its prediction.

The World Health Organisation's model of health as a physical, psychological and social state (WHO, 1980) and the distinction of impairment, disability and handicap may be useful in considering the impact of a voice disorder. It also highlights the gap which exists in current research which to date, focused mainly on impairment ('system (dys) function' (WHO, 1980, p.14)), as opposed to the disability ('consequence of the impairment in terms of the functional performance and activity by the individual' (WHO, 1980, p.15)), and the handicap (the disadvantages imposed by the impairment or disability that limits the individual's psychosocial functioning). One of the important questions revolves around the relationship between disability and handicap.

Given that handicap is the ability to perform in the social world, it is likely that not all disabilities would manifest in handicap, and also that when an impairment is removed, the person may still choose not to use this particular function in the social world.

There is evidence in recent studies to suggest that a moderate to severe negative impact is perceived by people with voice disorders in several critical functional domains, including work, social psychological, physical and communicative domains (Smith et al., 1996). However, only one study (Smith et al., 1994) examined these issues in relation to voice disorders, but looked at this group in general, as opposed to in specific diagnostic categories. One of the aims of the current study was to explore the disability, or the disadvantages and limitation in performance, imposed by adductor spasmodic dysphonia, and to examine the factors that are associated with voice disability in this condition.

5.2.1 The Assessment of Voice Disability

The VDQ, developed and used in this study to assess disability associated with voice impairment, is an outcome measure specially created to complement other existing clinical measures. The psychometric analysis of the VDQ will be discussed first, followed by a comparison with other questionnaires.

To examine the inherent structure of the VDQ, a principal component analysis was conducted firstly on the ASD group, which yielded five components: 'social isolation', 'negative communication', 'public avoidance, 'limited understanding' and 'communication difficulty'.

'Social isolation' (component 1) is a common feature of disability and may result from enforced isolation as a consequence of problems of communication, or from voluntary social withdrawal because of the stigma associated with disability, or both. Social isolation featured in Smith et al.'s study (1996), which showed that voice problems could contribute to social isolation particularly as a result of inadequate voicing to be understood. Smith stresses that this particular effect of voice disorders on quality of life, could be age-dependent.

'Negative communication' (component 2) is another common feature of voice disorders which describes the individual's difficulty in speaking out. Cannito et al. (1994) found that the majority of their spasmodic dysphonia subjects exhibited excessively negative attitudes towards communication before Botox intervention.

'Public avoidance' (component 3) and 'limited understanding' (component 4) illustrate other aspects of the impact of voice disability in patients with spasmodic dysphonia. Despite the fact that patients' disability is only apparent when they attempt to communicate, they demonstrate public avoidance as well as difficulty being understood, in a similar range of severity to patients with severe medical conditions (Bendtsen & Hornquist, 1993).

'Communication difficulty' (component 5) reflects the perceived communication problems involving difficulty with telephone conversations and the necessity to repeat statements because of being poorly understood. Communication difficulty has been acknowledged by Smith et al. (1996) who found that it was the most commonly reported problem by as many as 58% of the subjects in their patient group.

Both the total and component scores were used in the analyses of results which showed that although there is some association among the component scores, each assesses an independent aspect of voice disability and handicap.

The internal reliability of the components of the VDQ was assessed by means of Cronbach' s coefficient alphas (DeVellis, 1991). They supported the internal reliability of the components of the VDQ as all were over 0.6. Test -retest reliability was also assessed in this study, where the scores from the first assessment visit were correlated with the scores from the second visit, i.e. when no intervention had occurred. The components of the VDQ yielded temporally stable responses which confirmed their reliability.

Validity may be inferred from the manner in which a scale was constructed, its ability to predict specific events or its relationship to measures of other constructs. Content validity, or the extent to which VDQ items reflect a content domain, was difficult to evaluate mainly because of the difficulty in determining whether the VDQ items are representative of voice disability, as there were no comparable scales that could be used for cross-validity.

There are other questionnaires that have been developed to assess voice disability and handicap. Smith et al. (1996) developed an assessment scale to measure the frequency and effects of voice problems on quality of life in different domains: job, social, psychological, physical, and communicative. Questionnaire data from 174 adult patients presenting to a hospital ENT clinic were compared to data from 173 nonpatients, of whom 2% described hoarseness. The questionnaire had been tested for reliability. Only responses indicating moderate or greater impairment were tabulated as "a problem" in data management. The Quality of Life Questionnaire, as the VDQ, was designed to be used as tools in order to explore the functional effects of voice disorders. In contrast to the Quality of Life Questionnaire, the VDQ is more concise and does not include the assessment of psychological well-being, as it was considered more appropriate to use existing, standardised assessments for evaluating the impact of voice disorders on psychological functioning. However, the main differences between the two questionnaires are related to the examination of their psychometric properties. While the VDQ was subjected to a test-retest assessment of reliability after a principal component analysis, the questions in the Quality of Life Questionnaire were tested for reliability by asking each question twice using slightly different wording. The similarity of the responses was evaluated using the Kappa and McNemar's statistics and response groupings were used in multivariate analyses (conditional logistic regression).

More recently, and since the current study was completed, another questionnaire has been published, the Voice Handicap Index (VHI) (Jacobson et al., 1997) (refer to section 1.8). Comparison between the three questionnaires; the VHI, the Quality of Life Questionnaire and the VDQ is shown in Table 5.1. The VHI, like the VDQ, is a self-assessment scale. It consists of three subscales which measure the patient's perceptions about the impact of a voice disorder upon functional, emotional and physical aspects of daily living. The authors employed similar statistical methods to the ones used in the current study (e.g. Cronbach's alpha coefficient and test-retest reliability), in order to assess the scale's overall reliability and stability which proved to be strong (Jacobson et al., 1997). Whilst both the VDQ and the VHI are similar in their application, they differ in their scoring system; the VHI provides a total score and three ratings, one on each subscale, whereas the VDQ provides a total score, as well as five component scores, each reflecting an independent aspect of voice disability and handicap. In summary, more similarities have been found between the VDQ, used in the current study, and the recently developed VHI, than between the VDQ and the Quality of Life Questionnaire. All these questionnaires do, however, require further research to establish their validity, reliability and sensitivity with different groups of individuals with voice disorders.

Table 5.1. Comparison between the VHI, Quality of Life Questionnaire (QLQ) and the VDQ

	Number of items	Structure/ Subscales	Structure Analysis	Test/Retest	Scoring
VDQ	28	5 components	PCA	Pearson Correlations	Total & 5 Components
VHI	57	3 subscales	-	Pearson Correlations	Total & 3 Subscales
QLQ	48	5 domains	-	-	Graded format

5.2.2 Factors Associated with Voice Disability

The relationships between voice disability and other variables were examined by means of correlation and multiple regression analyses. These will be discussed below.

The impact of spasmodic dysphonia has been well documented in recent studies (Murry et al., 1994; Cannito et al., 1994; Cannito, 1992). However, to date, no study has investigated whether the way in which individuals cope influences disability. Coping in this study was assessed by means of the Voice Impairment Coping Questionnaire which was shown to consist of five independent scores, each reflecting a different aspect of coping. 'Physical avoidance coping' was the only coping component that correlated significantly with voice disability before intervention. It accounted for 35% of the variance of the total score of voice disability, 27% of the variance in 'social isolation', and for 18% of the variance in 'public avoidance', when entered into the regression equation after the demographic variables and symptom length, and before measures of psychological well-being and voice disability. These findings suggest that coping is a powerful predictor of aspects of voice disability, which is in line with the model of this study (Lazarus, 1991), which regards coping as an intervening process, adopted by the individual in response to illness demands. An interpretation of these findings would be that 'physical avoidance coping' is an appropriate strategy in adductor spasmodic dysphonia, and this physical avoidance in turn affects the degree of 'social isolation'. It is, however, possible that voice disability leads to physical avoidance and that this cross sectional analysis is unable to establish clearly the causal direction.

Measures of depressed and anxious moods failed to add significantly to the explanation of voice disability before intervention, once coping had been taken into account. Furthermore, depressed and anxious moods did not significantly correlate with 'physical avoidance coping'. It must be noted, however, that even when these variables were added to the multiple regression after demographic variables and symptom length and before 'physical avoidance coping', they failed to add significantly to the explanation of voice disability, whereas coping still accounted for

36% of the variance. These results reinforce the finding that 'physical avoidance coping' is a powerful predictor of voice disability.

In the current study, self-esteem accounted for 7% of the variance of 'social isolation' before intervention, when entered into the equation after demographic variables, symptom length and 'physical avoidance coping'. The lower the self-esteem, the greater the social isolation. These results are in common with other studies that found an association between voice disability and low self-esteem (Andrews, 1995). Again, causal direction in this cross sectional analysis is open to question.

The perceived adequacy of the social support scales of close and diffuse relationships also failed to add significantly to the understanding of voice disability when entered into the analysis after demographic variables, symptom length and 'physical avoidance coping'. Furthermore, perceived adequacy of close and diffuse relationship did not correlate significantly with 'physical avoidance coping'. Social support is viewed in many studies as a coping resource or coping assistance (Newman, 1996; Throits, 1986). It is therefore somewhat surprising that no significant relationship was found between coping and social support. However, social support, like coping, was viewed in this study as an intervening factor. These results indicate that 'physical avoidance coping' is a more powerful predictor of voice disability , than social support.

The findings of this study indicate that health locus of control and **expectations** are not associated with voice disability in ASD, before Botox intervention.

5.2.3 Changes in Voice Disability Over Time - The Impact of Intervention

This section will examine the impact of Botox interventions on voice disability, as measured by the VDQ total score and the five independent components. Comparison of the short and long term impact of the two Botox interventions is shown in Table 5.2, followed by a discussion of the findings.

Table 5.2 The Short and Long-Term Impact of Botox Interventions on Voice Disability

	First Intervention		Second Intervention	
	short-term	long-term	short-term	long-term
VDQ total score	*	-	*	-
Social Isolation	*	-	*	*
Negative Communication	-	-	*	-
Public Avoidance	-	-	-	-
Limited Understanding	-	-	*	-
Communication Difficulty	-	-	-	-

* Significant reduction in disability following intervention
\- No change

To date, most studies on spasmodic dysphonia have focused on the impact of intervention on impairment , i.e. phonation (Zwirner et al., 1992; Woodson et al., 1991; Murry et al., 1991; Ford et al., 1989). In the present study, the impact of intervention was examined in relation to impairment , as well as disability and handicap. The current findings indicated that intervention had a significant effect on impairment. Speech and language therapists rated impairment, using the Buffalo Voice Profile lll and recorded a significant improvement in various aspects of phonation e.g. 'muscle hypertense' and 'overall voice quality'. These findings are in line with those of other authors who reported significantly improved phonation with Botox injections, with primary response occurring one week after injection (Zwirner et al., 1992; Woodson et al., 1991; Murry et al., 1991; Ford et al., 1989). The persistent breathiness perceived by clinicians one week following intervention is also in common with other studies (Zwirner et al., 1993; Ford et al., 1989). Clinical experience has indicated that many patients develop symptoms of mild glottal incompetence during the 72 hours after the injection, resulting in a breathy voice quality. This would explain the lack of perceived improvement in 'laryngeal tone breathy' which was reflected in clinicians' ratings.

Several writers have documented that an assessment of impairment does not coincide with an assessment of disability or handicap (Sarno, 1965; Aten, 1986; Murry et al., 1994). Impairment in relation to voice disorders, ASD in particular, may lead to, but is not the same as, voice disability. The examination of the results concerning the changes in voice disability with intervention, versus the changes in impairment, highlights the importance of the relationship between impairment and disability, as well as the need to be aware of the limitations of current assessments and the need to consider not only the global index of disability but also its component parts (Oxenham et al., 1995). The changes in voice disability components following Botox interventions will be discussed below.

Short-term impact

Examination of the short-term impact of first intervention on voice disability showed that VDQ total score and the disability measure of 'social isolation' (component 1), decreased significantly one week following first intervention. The improvement in VDQ total score suggests an overall reduction in voice disability as a result of intervention. As symptoms improve, perceived overall disability decreases and 'social isolation', in particular, decreases following intervention.

An interesting question arises when examining the short-term outcome of second intervention, as to whether the second intervention would affect the same or other aspects of voice disability. The results of the current study showed a significant decrease in voice disability total score, as well as the disability measures of 'social isolation', 'negative communication' and 'limited understanding' one week following second intervention. These results imply therefore that the second Botox intervention had a greater short-term impact on voice disability than the first intervention, suggesting that the interventions may have an accumulative effect on disability.

The disability measures of 'public avoidance' and 'communication difficulty' did not change significantly at one week following first and second interventions. Thus, it could be that some aspects of voice disability, such as 'public avoidance' and 'communication difficulty', may take longer to change following intervention.

Long-term impact

The results of the current study failed to show significant long-term changes in voice disability following first intervention. Examination of the long-term impact of second intervention yielded that the disability measure of 'social isolation' showed a significant decrease at this time point, compared with the degree of 'social isolation' before intervention and at one week following first intervention. These results therefore indicate that the second intervention had a more significant long-term impact on 'social isolation' than the first intervention. Social isolation has been identified in recent studies as a feature of voice disability (Smith et al., 1996). Similarly, social isolation in spasmodic dysphonia results from voice disability. These results suggest that individuals may need time and experience of more than one Botox intervention to effectively reduce their social isolation.

5.2.4 Factors Predicting the Impact of Intervention

Short-term prediction of Botox interventions

The short-term predictor of the disability measure of 'social isolation' following first intervention was 'religion/wishful thinking coping'. Decrease in the use of 'religion/wishful thinking' was associated with an increase in short-term improvement of 'social isolation', following first intervention. These results would therefore seem to imply that the use of 'religion/wishful thinking' is associated with poorer outcome. The coping strategy of wishful thinking has been generally associated with poorer outcome (Newman et al., 1996). However, the role of religion as a coping mechanism and its influence on outcome remain relatively an unexplored area (Dien & Stygall, 1997). Studies on chronic pain (Muthny et al., 1992), HIV (Hall, 1994), and cancer (Furnham, 1994), have found religion to be a common coping mechanism. The findings of studies examining religion and adjustment in cancer patients have been variable, with some suggesting positive (Carver et al., 1993), some negative, and some no association with adjustment and outcome (Baider et al., 1983; Wiesman et al., 1976).

Age and marital status, measured before intervention, have emerged as significant short-term predictors of the disability measure of 'limited understanding' (component 4). Greater short-term decrease in 'limited understanding' was associated with age and with being married. A recent study (Smith et al., 1996) has shown that various aspects of voice effects on disability and handicap appear age-dependent. The age groups in Smith et al.'s study were categorised on the basis of different phases in life related to schooling and work/career status; <21, 22-39, 40-65 and >65 years. Smith et al. (1996) found that older people were more likely than other age groups to report that voice problems led to negative interactions, leading to avoidance of social situations. The mean age of subjects in the current study was 49.7 years, which would be comparable to Smith et al.'s age group category of 40-65 years. A possible explanation for these results would be that adductor spasmodic dysphonia could contribute to limited understanding through inadequate voicing to be understood. These limitations are probably more likely to affect the 40-65 age group (into which the subjects from the current study fall) because of social and vocational implications; people in this age group are likely to be more established in their career and jobs, and more socially active. Conversely, those over 65 years are likely to be primarily retired and more socially isolated. These results are in common with Smith et al.'s findings (1996) who found that age had a significant adverse effect on disability and handicap in people with voice disorders.

Another interesting finding was the contribution of marital status, especially in view of the influence of marital status on how people cope with disability (Newman et al., 1996). The influence of marital status on voice disability has been noted by other researchers. Gardn er (1961) observed that 'success or failure' following laryngectomy depends upon the attitude of the spouse towards the partner's disability and handicap, in that patients with supportive spouses are likely to make greater efforts to speak following laryngectomy. Similarly, Gibbs and Achterberg-Lawlis (1979) concluded that patients with a partner have a greater chance of making progress in acquiring oesophageal voice if they are actively encouraged by their partner. Manne and Zautra (1989) examined the impact of husbands' criticisms on their wives' coping and found a direct negative relationship between spouses' critical comments and wives' coping with rheumatoid arthritis. Patients with critical spouses tended to engage in more wishful thinking, associated with ineffective coping.

The most powerful short-term predictors of voice disability following second intervention were 'religion/wishful thinking coping' and 'chance' health locus of control. 'Religion/wishful thinking coping' emerged as a strong predictor of voice disability total score, as well as the disability measure of 'limited understanding'; the greater the use of 'religion/wishful thinking coping', the lesser improvement shown by ASD subjects in voice disability total score and 'limited understanding'. Furthermore, it was found to be a stronger predictor of short-term changes in voice disability following second intervention, than following first intervention but the direction of its influence remained unchanged, in that it is associated with poorer short-term outcome of both interventions.

The contribution of 'chance' health locus of control, measured before intervention, to the explanation of the voice disability measures of 'social isolation' and 'public avoidance' following second intervention is interesting, as the results indicated that the greater the use of 'chance' health locus of control, the poorer the outcome in terms of improvement in 'social isolation' and 'public avoidance', as a result of intervention. This implies that ASD subjects, who believed that fate and chance determine their health and illness, benefited less in the short-term from the second intervention. Locus of control influences the individual's reaction to events and may affect his/her ability to cope with them effectively (Moir, 1988). An extensive literature indicates that individuals with external health locus of control, including 'chance' locus of control, exhibit a wide range of maladaptive coping responses when confronted with stressors (Folkman, 1984). Thus, these studies are in agreement with the results of the current study which link 'chance' health locus of control and 'religion/wishful thinking coping' with poorer short-term outcome of the second Botox intervention.

The examination of the acute results of both first and second interventions raises the question as to whether the short-term outcome of first intervention can predict the short-term outcome of second intervention. In general, it was not possible to accurately predict the outcome of second intervention from the outcome of first intervention. However, the current findings indicated that the improvement in certain measures of voice disability following first intervention predicted the short-term outcome of second intervention. For example, the greater the improvement in the disability measure of 'limited understanding' following first intervention, the greater the decrease in 'social isolation' at one week following second intervention. These results therefore suggest that improvement in 'limited understanding' following first intervention predicted the improvement in the disability measure of 'social isolation' following second intervention. In addition, depressed mood measured at one week following first intervention emerged as another predictor of the short-term changes in the disability measure of 'communication difficulty' (component 5), following second intervention. The lower the level of depressed mood at one week following first intervention, the greater the improvement in 'communication difficulty' at one week following second intervention. These results highlight the importance of the accumulative effect of a series of interventions on outcome.

Prediction of the long-term impact of Botox interventions

Coping, measured before intervention, emerged as the only significant long-term predictor of voice disability (total score) and the disability measure of 'social isolation'. The significant role of coping as a mediator between impairment and disability was discussed earlier. However, what is of particular interest is the contribution of 'religion/wishful thinking coping', as once again, the results indicated that greater use of this coping strategy led to poorer outcome, expressed in reduced improvement in voice disability and greater social isolation. No other measure appeared to have an impact on the long-term changes in voice disability three months following first intervention. Furthermore, it was not possible to predict the long-term impact of the first intervention on the disability measures of 'negative communication', 'public avoidance', 'limited understanding' and 'communication difficulty'. The finding that 'religion/wishful thinking coping' emerged as a short-term as well as a long-term predictor of the first Botox intervention suggests that this is a common strategy used by ASD patients, which does not change over time. This could perhaps explain the failure to find significant long-term changes in 'social isolation' following first intervention. It could be postulated that ASD subjects continue to use 'religion/wishful thinking' coping, which is linked in the current study to poorer outcome, and therefore continue to experience social isolation. The current results are in agreement with other studies which associated the coping strategy of wishful thinking with poorer adaptation and ineffective outcome (Newman, 1996).

Self-esteem was the only significant predictor of voice disability measure of 'communication difficulty' (component 5), three months following second intervention. Higher self-esteem was associated with greater decrease in communication difficulty following intervention. In common with the present findings, the evidence in the literature suggests that a bi-directional pattern of causation exists between communication difficulty and psychological well-being, including self-esteem, in that reduced communication difficulty leads to higher self-esteem, and high self-esteem leads in turn to reduced communication difficulty (Andrews, 1995).

No factors assessed before first and second interventions predicted the long-term impact of the first and second intervention, except for 'religion/wishful thinking coping' and self-esteem. As no studies to date have attempted to predict the outcome of Botox intervention, expressed in changes in voice disability, no comparisons can be made.

5.3 PSYCHOLOGICAL WELL-BEING

This section will address the factors associated with psychological well-being before intervention.

5.3.1 Concurrent Explanation of Psychological Well-Being

Depression

The disability measure of 'limited understanding' (component 4) emerged as the variable that explained depressed mood before intervention; the greater the disability associated with 'limited understanding', the higher the level of depressed mood. These finding suggest that one specific measure of voice disability, 'limited understanding', is a powerful predictor of depressed mood. 'Limited understanding ' is a common feature of disability associated with voice disorders, spasmodic dysphonia in particular. One interpretation of these findings could be that spasmodic dysphonia leads to a degree of limited understanding which in turn leads to depressed mood. Other studies on chronic illness also suggested that measures of disability are powerful predictors of depressed mood and that increasing disability would lead to greater depressed mood (Cassileth et al., 1984; Newman et al., 1989). However, despite the evidence in the literature concerning the disability associated with spasmodic dysphonia, most studies that have considered depressed mood in patients with this condition (e.g. Cannito, 1991; Murry et al., 1994) have failed to analyse the relative contribution of voice disability to depressed mood.

It is somewhat surprising that 'information seeking coping' failed to add significantly to the explanation of depressed mood before intervention, although it was entered into the equation before the disability measure of 'limited understanding'. These findings highlight the important role of the disability measure of 'limited understanding' in determining depressed mood states in individuals with ASD.

Anxiety

The use of 'social comparison/distraction coping' was linked to a decrease in anxious mood state. Evidence in the literature indicated that comparison with those in a similar or worse state leads to a sense of psychological well-being (Andrews, 1995). This could explain why the ability of ASD subjects to cope with their impairment would positively affect their anxious mood and could lead to a better psychological outcome.

Other studies indicated that the impact of chronic disease, e.g. rheumatoid arthritis, is mediated through a number of psychosocial factors including coping responses (Newman et al., 1996), and that coping style has an impact on psychological well-being. Thus, it could be that individuals with ASD who use the coping strategy of 'social comparison/distraction' exhibit reduced anxious mood.

'Internal' health locus of control failed to add significantly to the explanation of anxious mood once demographic, symptom duration and coping had been taken into account, although greater use of 'internal' health locus of control was significantly associated with decrease in anxious mood before intervention. These findings are in line with other studies that linked weaker internal beliefs with higher levels of state anxiety before intervention (Wallace, 1986). The fact that voice disability did not correlate significantly with anxious mood before intervention and was therefore not entered into the equation would seem to suggest that anxious mood state pre-intervention was not related to the disability associated with spasmodic dysphonia as suggested by Cannito (1994).

Self-esteem

The disability measure of 'social isolation' (component 1) made a significant independent contribution to the explanation of self-esteem before intervention. Greater reduction in social isolation was linked to higher self-esteem. One interpretation of these findings could be that ASD leads to social isolation, which in turn leads to a decrease in positive mood states. The relationships between aspects of voice disability and self-esteem is supported by evidence in the literature (e.g. Andrews, 1995), which suggests that, on the whole, the disability and restrictions associated with voice disorders will always affect the patient's self-esteem in some way, because communicative interactions are impaired.

No other variables assessed prior to the first intervention correlated significantly with self-esteem before intervention.

5.3.2 Factors Predicting the Impact of First and Second Interventions on Psychological Well-Being

Prediction of depressed mood

No factors assessed prior to intervention predicted the impact of the first and second interventions on depressed mood. These results are perhaps not surprising, given that depressed mood difference scores, reflecting changes in depressed mood following first and second interventions, did not show any significant change over time and did not significantly correlate with any of the factors measured before interventions. Considering the significant contribution made by some measures of voice disability to the explanation of depressed mood before intervention, it could be argued that measures of voice disability should be able to predict depressed mood following intervention. One possible explanation to these finding is the evidence provided by some studies of the progressive 'uncoupling' of disability and psychological well-being over time in chronic conditions (Deyo et al., 1982; Newman et al., 1989). Thus, it could be postulated that the relationship between disability and depressed mood changes over time, especially with intervention. This could explain why measures of voice disability did not add significantly to the explanation of depressed mood following Botox interventions.

Prediction of Anxious Mood

Social comparison/distraction coping and 'powerful others' health locus of control, measured before first intervention, emerged as the two predictors of anxious mood three months following first intervention; reduction in anxious mood was associated with greater use of the coping strategy of 'social comparison/distraction', as well as the use of 'powerful others' health locus of control. That 'social comparison/distraction coping' remains a predictor of anxious mood following first intervention, in addition to being the only factor that added significantly to the understanding of anxious mood before intervention, suggests that it is a powerful predictor of anxious mood. Furthermore, the findings suggest that the pattern of coping style adopted by ASD subjects in this study does not change following intervention and that the use of 'social comparison/distraction coping' leads to reduction in anxious mood following first intervention.

The voice disability measure of 'communication difficulty' failed to make a significant contribution to the explanation of anxious mood following first intervention. These results could perhaps be attributed to the fact that 'communication difficulty' was entered into the equation after demographic variables, symptom duration, social comparison/distraction coping and 'powerful others' health locus of control had all been taken into account. Another explanation to these findings could be that following intervention, ASD subjects adapt to their disability which leads to decrease in anxious mood. It is possible that this adaptation over time that could explain why the voice disability measure of 'communication difficulty' failed to add significantly to the explanation of anxious mood following first intervention.

The improvement in voice disability following second intervention emerged as the sole predictor of anxious mood following second intervention; the greater the improvement in voice disability, the greater the decrease in levels of anxious mood. These findings imply that decreased anxious mood following second intervention is associated with outcome, as it is the improvement in voice disability that explained the variance in anxious mood. 'Finding new meaning coping' failed to add significantly to the explanation of anxious mood following second intervention. It is interesting to note that the use of this coping strategy before second intervention was linked to increased anxious mood following intervention. It is not possible, however, to explain why 'finding new meaning coping' did not have a significant role in predicting anxious mood following second intervention, on the basis of the current data.

Prediction of Self-Esteem

'Chance' health locus of control, measured before first intervention, and the improvement in voice disability one week following first intervention, were the most powerful predictors of self-esteem following first intervention. Decrease in the use of 'chance' health locus of control and greater improvement in voice disability following first intervention were associated with an increase in self-esteem. These results are in line with other studies that found a relationship between external beliefs about control, including chance, and poor psychological well-being (Tennen et al., 1992).

The improvement in voice disability (total score) following first intervention made an independent contribution to the prediction of self-esteem following first intervention, after demographic variables, symptom duration and 'chance' health locus of control have been taken into account. These results support the evidence in the literature indicating that voice disorders are associated with reduced self-esteem (Andrews, 1995); restriction in a person's ability to use the voice results in disruption in social interaction and the person's sense of competency and control, which in turn affect self-esteem. Thus, an improvement in voice disability following intervention would lead to higher self-esteem (Andrews, 1995). These results confirm that changes in disability are mirrored in changes in psychological well-being, as indicated by the ability of improvement in voice disability to predict anxious mood and self-esteem following intervention.

Anxious mood measured before intervention failed to add significantly to the prediction of self-esteem following first intervention, when entered into the equation after demographic variables, symptom duration, 'chance' health locus of control and improvement in voice disability have been considered. This provides further support to the earlier findings which indicated that positive mood states are not the opposite of negative moods, e.g. anxious mood, and further supports the need to examine self-esteem independently.

It was not possible to predict the changes in self-esteem following second intervention on the basis of variables measured three months following first intervention. The results of the current study showed that improvement in voice disability three months following second intervention correlated significantly with higher self-esteem, however it failed to add significantly to the prediction of self-esteem following second intervention, when entered into the equation after demographic variables and symptom length have been considered. These results, however, show a trend which confirms the role of improvement in voice disability as a predictor of self-esteem.

5.4 DIFFICULTIES ENCOUNTERED IN THE STUDY

Assessment materials

Objective measures of voice characteristics in spasmodic dysphonia are rather difficult. The parameters measured in evaluating vocal function may not reflect the perceived impairment defect and furthermore, the physical and emotional difficulties experienced by the patient in attempting to communicate cannot be measured directly. Nevertheless, ideally, a comprehensive assessment of patients with spasmodic dysphonia should consist of both objective and subjective parameters. It is acknowledged, therefore, that future studies should employ objective measures, e.g. acoustic analysis, in addition to the measures used in this study. However, measures should be carefully selected to ensure a common basis for comparison.

Temporal issues

A temporal issue that should be considered in relation of outcome is the timing of assessments and the time interval that should be studied. In this study, the decision concerning the temporal issue was largely dictated by the course of Botox intervention and clinical treatment. Thus patients were assessed before intervention, at one week following intervention and three months following intervention. In common with others (Woodson et al., 1992), our clinical experience has been that voice quality improves but is frequently unstable during the first 1-2 weeks following Botox injection. The temporal issue, however, arises particularly in relation to long-term effect of Botox. In some studies long-term measurements are carried out 1-2 months following intervention (Woodson et al., 1992). Given the parameters assessed in this study, e.g. coping, the author considered this time interval too short, as it was thought that it would not provide a representative picture of changes in coping and psychological well-being over time. However, it is acknowledged that at three months post-intervention, symptoms return and the long-term effect of intervention, i.e. the time patients experience maximum benefit from the injection, might have been missed. The complexity of voice in spasmodic dysphonia has been recognised by other authors (Izdebski et al., 1981; Woodson et al., 1992). Thus, it is not possible to provide a conclusive answer to the temporal issue related to assessment of intervention outcome.

5.5 IMPLICATIONS FOR CLINICAL PRACTICE

One aspect that should be considered in the management of voice disorders in general, is the patient's quality of life. Although some research , e.g. in head and neck cancer, has addressed this issue, the patient's subjective perception has yet to be incorporated into evaluative research in health care provided to this patient group. From a clinical standpoint and on the basis of the results of this study, it is clear that regardless of etiologic interpretation, given the recurrence of symptoms following Botox injections, it is doubtful that lasting gains will be made unless aspects like coping, adaptation and psychological well-being are considered.

The findings in this study suggest that a study should be conducted to examine the efficacy of modified intervention programmes for patients with spasmodic dysphonia, using a combined-modality of behaviour therapy and patient education, in addition to Botox therapy. Research to date indicates that there is considerable scope for the use of psychological therapies to assist disability in chronic conditions. This combined modality approach should be tried and tested in relation to outcome in this patient group.

Some studies have shown that the effective treatment of ASD requires the patient to implement additional strategies in terms of voice use following Botox injection (Murry & Woodson, 1995). Thus, part of the intervention could be, for example, to train patients with 'chance' or 'powerful others' health locus of control orientation to hold beliefs which are more internally orientated. This approach has been successfully adopted in relation to stammering (Craig & Andrews, 1985), as it was found that the subject's locus of control orientation influences the probability of maintaining fluency more effectively following intervention.

The Voice Disability Questionnaire (VDQ), developed and used in this study for measuring the psycho-social disabling effects of adductor spasmodic dysphonia, was found to have meaningful component ratings that described different aspects of voice disability. Larger studies of subjects with different types of dysphonia need to be undertaken to allow for the assessment of disability and handicap in relation to specific diagnostic categories. Normative data from a control group could also be established.

5.6 SUMMARY AND SUGGESTIONS FOR FUTURE RESEARCH

In common with other studies concerning disability and handicap, a number of methodological issues in the study of spasmodic dysphonia limit the ability to draw detailed general conclusions. Firstly, objective description and assessment of this condition is quite difficult (Woodson et al., 1992). Symptom severity varies considerably over time. with different situations,and testing environment can strongly influence results. Secondly, the objective parameters used to measure vocal function may not adequately reflect the perceived impairment and the psychosocial and emotional factors that contribute significantly to the overall severity of spasmodic dysphonia. Although there has been acknowledgement in the literature that spasmodic dysphonia can have a devastating impact on daily functioning and quality of life, there are no standardised instruments that have been specifically developed to address this issue. Accordingly, one of the most important outcomes of the present investigation is a psychometrically validated voice disability questionnaire and a coping inventory that can be used with patients exhibiting a variety of voice or communication disorders.

At a general level, research on spasmodic dysphonia has focused mainly on physical aspects in relation to outcome. The present study has produced some interesting and important findings related to psychosocial aspects of spasmodic dysphonia, demonstrating that factors such as coping, have a significant influence on outcome and disability. However, the strength of this concept in relation to psychological well-being and disability needs to be further investigated, looking into its role in the context of voice disorders in general.

This study demonstrated that the use of Botox for the treatment of spasmodic dysphonia extends beyond the changes in voice quality. Further research is needed to monitor long-term changes in psychological well-being measures to determine whether the severity of spasmodic dysphonia as measured by objective voice analysis is related to the degree of depression, anxiety and self-esteem in patients with spasmodic dysphonia.

The results concerning the prediction of voice disability, raise the question of whether one can predict which subjects are likely to benefit from intervention and to what extent. However, while some variables, e.g. coping, accounted for a relatively large proportion of the variance in voice disability following intervention, it is obvious that there are other variables that would increase the predictability of outcome. It would be interesting to determine whether the inclusion of other variables which assess voice quality objectively, e.g. acoustic parameters, would be more accurate at predicting outcome of Botox intervention. This may lead to a better understanding of the effect of Botox intervention on impairment, disability and handicap in individuals with adductor spasmodic dysphonia.

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APPENDICES

APPENDIX 1

VOICE DISABILITY QUESTIONNAIRE

The following are statements about your current communication/voice and how they may influence your everyday life. Please note to what extent you agree with the following statements by underlining the term that is nearest to the answer you would give.

Communication

1. Because of my voice problem, I communicate mostly by nodding my head, pointing or using sign language, or gestures.

Strongly agree Agree Uncertain Disagree Strongly disagree

2. Because of my voice problem, my speech is understood only by a few people who know me well.

Strongly agree Agree Uncertain Disagree Strongly disagree

3. Because of my voice problem, I am understood with difficulty.

Strongly agree Agree Uncertain Disagree Strongly disagree

4. Because of my voice problem, I talk less to other people.

Strongly agree Agree Uncertain Disagree Strongly disagree

5. Because of my voice problem, I have trouble speaking in a noisy setting.

Strongly agree Agree Uncertain Disagree Strongly disagree

6. Because of my voice problem, I often have to repeat my statements to make myself understood.

Strongly agree Agree Uncertain Disagree Strongly disagree

7. Because of my voice problem, I cannot have a good discussion.

Strongly agree Agree Uncertain Disagree Strongly disagree

8. Because of my voice problem I have trouble using the telephone.

Strongly agree Agree Uncertain Disagree Strongly disagree

Work

9. I am unable to cope with certain tasks at work, because of my voice problem.

Strongly agree   Agree   Uncertain   Disagree   Strongly disagree

10. My voice has restricted my advancement at work.

Strongly agree   Agree   Uncertain   Disagree   Strongly disagree

11. I work in a job that does not require using my voice, because of my voice problem.

Strongly agree   Agree   Uncertain   Disagree   Strongly disagree

12. I have given up my job because of my voice problem.

Strongly agree   Agree   Uncertain   Disagree   Strongly disagree

13. I am not getting as much work done as usual because of my voice problem.

Strongly agree   Agree   Uncertain   Disagree   Strongly disagree

Social Interaction

14. I go out to visit people less often because of my voice problem.

Strongly agree   Agree   Uncertain   Disagree   Strongly disagree

15. I go out less often because of my voice problem.

Strongly agree   Agree   Uncertain   Disagree   Strongly disagree

16. Because of my voice problem, I tend to do inactive pastimes which do not involve talking, for example, I watch TV more, play cards or read books.

Strongly agree   Agree   Uncertain   Disagree   Strongly disagree

17. Because of my voice problem, I take part in fewer community activities.

Strongly agree   Agree   Uncertain   Disagree   Strongly disagree

18. I show more interest in other people's problems because I cannot communicate with them.

Strongly agree   Agree   Uncertain   Disagree   Strongly disagree

19. Because of my voice problem I avoid having visitors.

Strongly agree Agree Uncertain Disagree Strongly disagree

20. Because of my voice problem, I make demands on other people or members of my family, for example, I insist they do the talking for me.

Strongly agree Agree Uncertain Disagree Strongly disagree

21. Because of my voice problem, I isolate myself as much as I can from the rest of my family.

Strongly agree Agree Uncertain Disagree Strongly disagree

22. I do not go out to visit people at all because of my voice problem.

Strongly agree Agree Uncertain Disagree Strongly disagree

23. Members of my family take advantage of the fact that I have difficulty with my speech.

Strongly agree Agree Uncertain Disagree Strongly disagree

24. Because of my voice problem, I am a burden on others.

Strongly agree Agree Uncertain Disagree Strongly disagree

25. Because of my voice problem, I do not do the shopping that I would like to do.

Strongly agree Agree Uncertain Disagree Strongly disagree

26. It is difficult for me to complain at the shop because of my voice problem.

Strongly agree Agree Uncertain Disagree Strongly disagree

27. Because of my voice problem, I avoid using public transport.

Strongly agree Agree Uncertain Disagree Strongly disagree

28. Because of my voice problem, I stay at home most of the time.

Strongly agree Agree Uncertain Disagree Strongly disagree

Comments

Would you please comment on the questionnaire, e.g. items that , in your opinion, need to be included or omitted, as well as items that require further clarification. THANK YOU.

APPENDIX 2

THE VOICE IMPAIRMENT COPING QUESTIONNAIRE

The following are some statements that people commonly make to describe how they cope with speech/communication disability. Could you think of the problems you may sometimes have because of your voice disorder and state for each statement how often you adopt the particular approach to the problem.

Underline the term that is nearest to the answer you give.

1. I find talking with friends and family about my voice problem helpful.

Never Almost never Sometimes Quite often Very often Always

2. I try to become involved in as many physical activities as possible to take my mind off my voice problem.

Never Almost never Sometimes Quite often Very often Always

3. I keep my frustration to myself, so few of my friends know that I am frustrated.

Never Almost never Sometimes Quite often Very often Always

4. It helps me cope with my voice problem if other people are sympathetic.

Never Almost never Sometimes Quite often Very often Always

5. I find it easier to cope with my voice problem when I compare myself to other people who have worse health problems.

Never Almost never Sometimes Quite often Very often Always

6. Having a voice problem has helped me to find some important truth about life.

Never Almost never Sometimes Quite often Very often Always

7. I find religion and praying to God help me cope with my voice problem.

Never Almost never Sometimes Quite often Very often Always

8. I find it easier to cope with my voice problem if I ask the doctor questions about it.

Never Almost never Sometimes Quite often Very often Always

9. I find it easier to cope with my voice problem by expressing my feelings outwardly.

Never Almost never Sometimes Quite often Very often Always

10. I try to convince myself that my voice problem is not really that disabling.

Never Almost never Sometimes Quite often Very often Always

11. I keep any worries I may have about my voice problem to myself.

Never Almost never Sometimes Quite often Very often Always

12. Having a voice problem has helped me develop into a better person.

Never Almost never Sometimes Quite often Very often Always

13. I try to find as much information as possible about my voice problem

Never Almost never Sometimes Quite often Very often Always

14. I take the view that there is very little I can do about my voice problem.

Never Almost never Sometimes Quite often Very often Always

15. I find myself wishing that I never had a voice problem

Never Almost never Sometimes Quite often Very often Always

16. I try to ignore my voice problem by looking only at the good things in my life.

Never Almost never Sometimes Quite often Very often Always

17. I try to avoid situations where my voice problem would become evident.

Never Almost never Sometimes Quite often Very often Always

18. When my voice gets bad, I find myself taking it out on others around me.

Never Almost never Sometimes Quite often Very often Always

19. I find it easier to cope with my voice problem by telling myself not to think about it.

Never Almost never Sometimes Quite often Very often Always

20. Resting my voice at times, helps me cope with my problem

Never Almost never Sometimes Quite often Very often Always

21. I ask people to help me with those things I cannot manage because of my voice problem.

Never Almost never Sometimes Quite often Very often Always

22. I cope better with my voice problem by trying to accept it, since nothing can be done.

Never Almost never Sometimes Quite often Very often Always

23. I find it easier to cope with my voice problem, if I do not use my voice.

Never Almost never Sometimes Quite often Very often Always

24. I find it easier to cope with my voice problem by wishing that it would go away or somehow be over with.

Never Almost never Sometimes Quite often Very often Always

25. I find it easier to cope with my voice problem by avoiding being with people in general.

Never Almost never Sometimes Quite often Very often Always

26. I find it easier to cope with my voice problem by joking about it.

Never Almost never Sometimes Quite often Very often Always

27. I find it easier to cope with my voice problem by finding out as much about it as I can.

Never Almost never Sometimes Quite often Very often Always

Comments

Would you please comment on the questionnaire, e.g. items that , in your opinion, need to be included or omitted, as well as items that require further clarification. THANK YOU.

APPENDIX 3

EXPECTATIONS REGARDING OUTCOME OF TREATMENT

How much do you expect your voice to improve as a result of the treatment you are going to receive? Please circle the number that represents the extent of your expectations.

1________2________3________4__________5__________6__________7
No improvement Great improvement