Bridging the gap in internet treatments for mental health: A fully automated online cognitive behaviour therapy for social anxiety for those who stutter

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AUTHOR'S DECLARATION

I, Fjóla Dögg Helgadóttir, certify that this thesis, *Bridging the gap in internet treatments for mental health: A fully automated online cognitive behaviour therapy for social anxiety for those who stutter*, is my own work. It is based on original data gained from my own research. It contains no material that has been written or published by another person, except where acknowledgment is made. This work has not been submitted or accepted for the award of any other degree or diploma**.** All research practices involved with this thesis were approved by the University of Sydney Human Ethics Committee.

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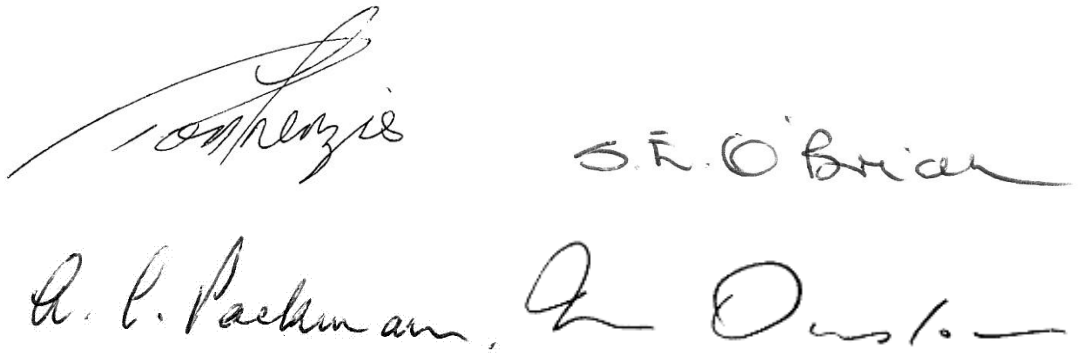
We confirm that Fjóla Dögg Helgadóttir has made the following contributions: Critical appraisal and theoretical review for publication, conception and design of the research, data collection, analysis and interpretation of the findings, leading the writing of the paper and critical appraisal of content and submission of manuscript for publication.



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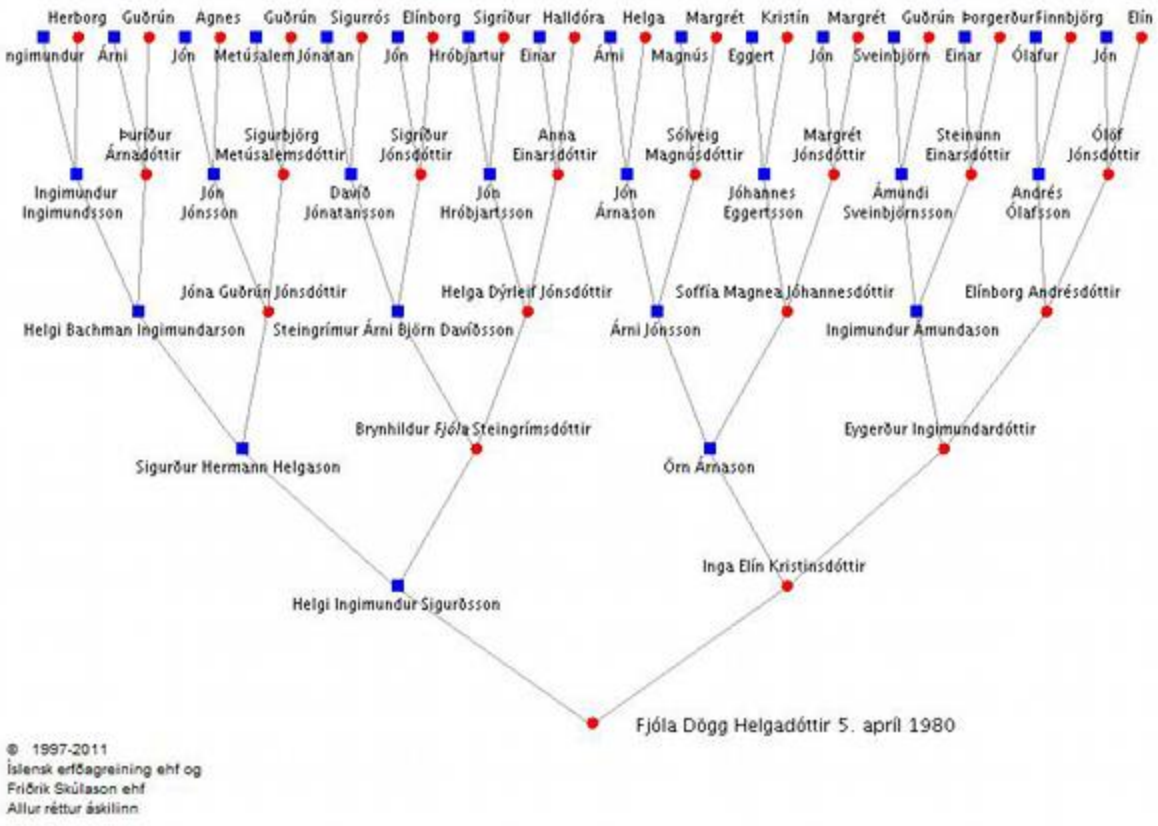

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ABSTRACT

Introduction: CBTpsych.com is a fully functional intervention that aims at bridging the gap between Eliza (Weizenbaum, 1966) and modern internet treatments for anxiety disorders (Helgadottir, Menzies, Onslow, Packman & O'Brien, 2009a). A Phase I trial demonstrated that two participants no longer met the diagnosis of social phobia on the DSM-IV and ICD-10 after being treated by CBTpsych.com. The quality of the interaction appeared to be similar to face-to-face therapy. The automated techniques were successful in engaging the participants and in encouraging them to log on regularly and complete the treatment (Helgadottir, Menzies, Onslow, Packman & O'Brien, 2009b). The current study is a phase II trial targeting social anxiety in stuttering.

Method: File audit data were gathered from 10 years of experience in the psychological management of social anxiety and stuttering (St Clare et al., 2008). This data was used to create a fully automated human-like intervention using algorithms alone. CBTpsych.com creates cognitive restructuring exercises, behavioural experiments, and negative thoughts checklists for the automated treatment program. Furthermore, other features such as imagery rescripting were incorporated to adhere to the Clark D. M. and Wells (1995) model of social anxiety treatment. 18 participants presenting for treatment of stuttering with social anxiety at the Australian Stuttering Research Centre (ASRC) were offered 5 months access to the "computer psychologist". 16 participants started using the computer program. The treatment did not involve any contact with clinical psychologists at the ASRC.

Results: Post-treatment analysis revealed that of the 16 participants who started using the program, 78% no longer met the criteria for social phobia. Furthermore, none of the 10 participants who completed all 7 sections of the computer program within 5 months had social phobia diagnosis at post-treatment. Consequently, in this study the "computer psychologist" was able to identify the specific problem areas participants reported and to design individualized formulations and tailored treatment components with corrective feedback. Furthermore, participants were able to engage in highly specific cognitive restructuring exercises, and with the help of the computer psychologist managed to build behavioural experiments to test out unhelpful cognitions. Data from this Phase II trial suggest that the computerised treatment protocol can lead to substantial reductions in anxiety and avoidance, and improve mood and quality of life as measured by the FNE, SPAI, BDI-II, UTBAS, SASS and OASES.

Conclusions: The computer psychologist motivated people both to log on regularly (with use of an automated email process) and to complete the program. It engaged clients in detailed cognitive restructuring work, creating successful behavioural experiments for exposure, and producing promising preliminary results. However, these results need to be tested in a randomized controlled trial to establish efficacy. A RCT is currently under way. The preliminary findings presented here suggest that it would be viable to develop this type of treatment intervention for other anxiety disorders. Limitations of this approach and suggestions for future research are discussed.

CHAPTER 1 - THESIS OVERVIEW

1.1 Introduction

Fresh air blew over the field of artificial intelligence (AI) in the 1950s. The initial excitement and optimism of its founders is best described by the famous quote of Herbert Simon: “I believe that, in our time, computers will be able to do anything a man can do. I believe that computers already can read, think, learn, create” (Simon, 1965 p. xiii). Yet the task turned out to be much harder than early researchers anticipated. For example, it took another three decades (1997) for the first computer to outsmart the top human chess player (IBM, 2010). This was unexpected, as chess, with its rigid and well-defined rules, seemed like an easy target for computers to master. Even in this case, the victory in 1997 was primarily due to the use of massive supercomputers and the availability of raw computational power, rather than the successful mimicking of human strategy, game play, and intelligence. Despite initial optimism, understanding and reproducing true intelligence (in a human sense) continues to be well beyond the reach of modern AI.

Eliza was a computer program that was released in 1966, still in the early days of the AI movement. The program responded to its users’ questions and statements that they typed on a keyboard. In many cases the users were convinced that a real person was behind the scenes (Weizenbaum, 1966). However, Eliza was fully automated, and based its output on algorithms that parsed the user’s input and formulated responses based on a

programmed model. The model was designed to imitate the style of an empathic therapist using the Rogerian approach (Rogers, 1951).

Eliza was the first use of automation to create the illusion of human-human clinical interaction through a human-computer interface. Some work has been conducted to progress this approach. For example, Colby (1999) has introduced more sophisticated natural language processing techniques into a program that conducts conversation-style psychotherapy, including some aspects of cognitive therapy. However, the program still relies on Rogerian-style questioning, and does not infer or store any patient-specific data that can be used to customise treatments.

In general, little progress has been made towards algorithmic techniques that are useful for treating mental disorders. The original goal of Eliza was to demonstrate and advance AI technologies such as natural language processing and pattern matching. In contrast, the goal within the clinical psychology community should be the application of these techniques to real world problems, and rigorous testing to ensure their validity.

The development of fully automated therapists that are indistinguishable from human therapists remains an unsolved problem, and will continue to be for the foreseeable future. However, there are techniques currently available in the psychology literature that

are suitable for automation, when treating specific, well-defined disorders. The goal of this thesis is to advance the state of the art through the development of an internet treatment program for social anxiety in adults who stutter, that does not require any therapist involvement.

Stuttering is a significant problem for the people who suffer from it. Negative peer reaction towards stuttering has been observed in children as young as 4 years old (Ezrati-Vinacour, Platzky, & Yairi, 2001; Langevin, Packman, & Onslow, 2009). Furthermore, a large body of evidence demonstrates that those who stutter are more likely to be bullied throughout the school years (Blood & Blood, 2004, 2007; Davis, Howell, & Cooke, 2002; Hugh-Jones & Smith, 1999; Langevin, Bortnick, Hammer, & Wiebe, 1998). Therefore, it is not surprising that social anxiety is highly prevalent in adulthood among this population, given the high correlation between social anxiety and bullying during school years (Gladstone, Parker, & Malhi, 2006; McCabe, Antony, Summerfeldt, Liss, & Swinson, 2003; Roth, Coles, & Heimberg, 2002).

In a recent study, Menzies et al. (2008) found that 60% (18/30) of adults who stuttered met the criteria of DSM-IV (American Psychiatric Association, 1994) for social phobia. This same study showed that cognitive behaviour therapy (CBT) can be an effective treatment for social anxiety in this group. Participants who received CBT, compared to those who did not, experienced an improved quality of life. Furthermore, the CBT

treatment resulted in the elimination of their social anxiety diagnoses. However, it should be noted that the CBT did not change the stuttering severity of the participants, also referred to as their fluency. In other words, although the CBT was able to successfully treat the social anxiety associated with the stuttering, it did not have an impact on the stuttering itself.

The majority of effective speech pathology treatments for improving fluency among adults who stutter fall under the umbrella of "prolonged speech" or "speech restructuring treatments" (see Packman, Onslow, & Menzies, 2000 for an overview). The essence of these treatments is the introduction of a novel speech pattern that is incompatible with the stuttered speech. Then, fluency is achieved via operant conditioning. Operant conditioning methods originate in laws that were elucidated by B. F. Skinner while he was a graduate student at Harvard University early in the 1930s.

Despite immediate positive results from speech restructuring treatments, only one in every three adults who stutters maintains the improved fluency in the long run (Craig & Hancock, 1995; Martin, 1981). A recent study focused on a group of 64 adults who stuttered and who received a successful speech restructuring treatment (Iverach et al., 2009a). The study demonstrated that the presence of a mental health diagnosis was a useful predictor of relapse at 6-month follow-up. Therefore, targeting mental health problems in the stuttering population is not only important for its own sake; it may also

help those who stutter to master speech restructuring techniques, and reduce the chance of long-term relapse.

1.2 The automation of psychology treatments

Menzies et al. (2008) published the first randomized controlled trial in the adult stuttering population demonstrating that CBT can help individuals deal with their social anxiety. The treatment was conducted by a highly experienced psychologist, with 10 years of clinical psychology experience as well as training and experience with the stuttering population.

Translating the successful results from Menzies et al. (2008) to the stuttering community has several barriers. Firstly, most clinical psychologists with extensive experience have not received training in anxiety in people who stutter. Secondly, the cost of such treatment, on top of standard speech treatment, would be high. Thirdly, stuttering has traditionally been managed by speech pathologists with little or no CBT training. Therefore, delivering the benefits of the Menzies et al. (2008) CBT trial to the community of adults who stutter presents a significant challenge.

A major goal of this thesis is to address the problem of delivering CBT to the stuttering community. A “computer psychologist” was developed that could identify the specific

problem areas patients reported, and design individualized formulations and tailored treatment components with corrective feedback.

File audit data was gathered from clinical psychologists who had over 10 years of experience in the management of social anxiety and stuttering. The "computer psychologist" used this data to formulate cognitive restructuring exercises, behavioural experiments, and several other novel features consistent with the CBT model of social anxiety of Clark D. M. and Wells (1995). Furthermore, sample answers were written for over 1000 of the possible situations that a client might encounter while using the program, enabling the "computer psychologist" to give automatic corrective feedback.

The "computer psychologist" was implemented as an online website. This had the advantage that it was easily accessible from anywhere in the world, and could be accessed by an unlimited number of people at the same time.

1.3 Thesis contribution

1.3.1 A new paradigm in the treatment of mental disorders

Modern internet treatments for mental health mostly involve a significant degree of human-human interaction in the form of physical contact, emails or phone calls (Helgadottir, et al., 2009a). The fully automated approach of this work was made possible through the use of file audit data from clinical interventions, and this has not been attempted before. Furthermore, there is an urgent need to test and experiment with automation within clinical psychology, given its numerous advantages and possibilities.

1.3.2 Novel features for online cognitive behaviour therapy for mental disorders

In the fully automated online CBT treatment, several novel features were used to enhance the client-computer experience:

Individualized automated corrective feedback: The programs starts by profiling the idiosyncratic problems of the user. In doing so, the program can deliver a customized intervention suited to the needs of the user. This gives users valuable insight into whether or not they are doing the right thing in the treatment program, maximising their treatment gains. For example, a user with an unhelpful thought such as "I won't be successful if I

stutter", might be asked to challenge this by having to demonstrate evidence for this thought. The user might write "this is what my father had once said to me", and therefore this would count as evidence. However, a sample answer might point out that the opinion of one person is not actual evidence and would not stand up in court of law, and that success depends on so many other things. Therefore, in the next exercise with a different thought the user would be better at confronting their unhelpful thinking with this feedback. Building a database with such feedback involved writing thousands of different clinical interventions, for thousands of different profile possibilities.

Voiceovers: Sound recordings are presented on every single page of the web treatment program. The voice guides users through the program, giving the feeling that they have someone "there" with them throughout the therapy. The use of voiceovers allows users to benefit from a senior clinician with 25 years of experience in managing anxiety. The voiceovers are delivered dependent on the user's behaviour. For example, if a user's anxiety fails to reduce after a behavioural experiment, the voiceover discusses the need for the repetition of the task. This further reinforces the feeling that users are interacting with another human being.

Automated emails: Users participating in the program are monitored by a separate computer program, and if they have not logged on for a certain length of time they

receive a reminder to continue the treatment. Automation of this adherence process has not yet been published in the mental health literature.

Automated time limits: In one published trial (Klein & Richard, 2001), an internet treatment program set 1 week time limit by which participants had to finish. This resulted in strong adherence rates. However, the time limits were manually monitored, reliant on human action. Given the finding of Klein and Richard, a separate fully automated program was written for this thesis, to monitor the progress of the participant. The users were given 5 months to finish the program.

1.3.3 Improved access to evidence-based clinical psychology service for the stuttering community

Only one randomized controlled trial has been published using cognitive behaviour therapy to target anxiety in stuttering (Menzies et al., 2008). In comparison, in a recent review, 1165 randomized controlled trials were found of the efficacy of cognitive behaviour therapy for anxiety in the non-stuttering population (Hofmann & Smits, 2008). This sheds light on the urgent need for clinical psychology treatment research for anxiety within the stuttering population. Furthermore, there are currently no studies on a treatment for social anxiety in stuttering incorporating recent innovations by Clark D. M. and Wells (1995). One challenge of this thesis was to decide which components to

include in the treatment, and how to find algorithmic implementations for use by the computer psychologist.

1.3.4 Determination of the safety and viability of the treatment (Phase I)

A Phase I trial was conducted to determine the safety and viability of the online treatment. This is the first study of its kind in social phobia research with no therapist contact.

The trial involved a case study of two males who stuttered and had a social phobia diagnosis. After receiving the treatment, both participants no longer met criteria for social phobia. Also, significant improvements were observed on other psychometric tests, including measures of unhelpful cognitions, behavioural avoidance, quality of life, and low mood. The quality of the interaction appeared to be similar to face-to-face therapy, indicating that the "computer psychologist" established an effective therapeutic relationship, and that the automated techniques used were sufficiently engaging to prompt the participants to log on regularly and complete the treatment program.

1.3.5 Determination of the power and effect size of this treatment (Phase II)

Following the successful Phase I trial, a Phase II trial was conducted with 18 participants. Again, the participants were given 5 months to complete the treatment and were assessed before and after the intervention. All primary measures indicated that the "computer psychologist" had sufficient effect size and power to continue on to a randomized controlled trial. The CBTpsych.com intervention demonstrated large reductions in social anxiety symptoms. Furthermore, a dose-response relationship was observed, indicating that the more the participants did of the computer program within the time limit, the larger the reduction they had in their social anxiety symptoms.

Other measures demonstrated impressive effect sizes, such as reductions in behavioural avoidance, improved quality of life, reductions in symptoms of depression and reductions in the frequency of experiencing unhelpful cognition. Finally, 78% of those who started the intervention no longer met the diagnostic criteria for social phobia after their 5-month interaction with the CBTpsych.com.

1.4 Thesis Organization

This thesis begins by reviewing the problem of stuttering in Chapter 2. This includes an overview of the origins, epidemiology and course of stuttering. Next, early and adult interventions are explored, and the chapter ends with a discussion of the problem of relapse from speech treatments. Chapter 3 reviews the origins of social anxiety, as well as its epidemiology and course. Cognitive models of social anxiety are presented. Chapter 4 provides an overview of treatment options for social anxiety. This includes evidence-based psychological treatments, drug treatments, and the treatment of social anxiety in stuttering. Chapter 5 covers the central problem that this thesis attempts to solve. This is the problem of a lack of delivery of CBT treatments into the stuttering community. The solution proposed is an online automated system, which is also presented in Chapter 5. Chapter 6 reviews the current state of the art of internet treatments for mental health, and identifies shortcomings of current treatment systems. Chapter 7 describes the Phase I trial, in which the safety and viability of the online treatment program was established. Chapter 8 reviews the Phase II trial, in which the power of the intervention was established. Finally, Chapter 9 presents conclusions and a discussion of possible directions for future research.

CHAPTER 2 – THE DISORDER OF STUTTERING

2.1 Origin

Stuttering is a chronic, disabling and debilitating speech motor problem. It is a problem with a complex origin. Its causes are not yet fully understood, although several hypotheses have been suggested. People who stutter are found in all cultures around the world, and an exponential amount of research findings about the problem have emerged during the last four decades (Guitar, 2006).

Both genetic and environmental factors are known to contribute to the problem of stuttering. However, the current consensus is that genes are more influential in the equation (Ambrose & Yairi, 1993; Curlee, 2004; Felsenfeld et al., 2000; Kidd, 1984; Yairi & Ambrose, 1996). Consequently, research into the origins of stuttering has been reduced to the level of neurobiological functions, and brain research in this area is blossoming at this point in time. A link between stuttering and activities in the basal ganglia has been supported by numerous findings (Alm, 2004; deAndrade, Sassi, Juste, & Mendonca, 2008; Smits-Bandstra & De Nil, 2007; Watkins, Smith, Davis, & Howell, 2008). Furthermore, a recent findings demonstrated changes in the basal ganglia, observed with a functional magnetic resonance imaging (fMRI), following a successful speech treatment (Giraud et al., 2008). Future advances in technology will without doubt

elucidate this process in more detail, which will give therapists a better understanding of the complex nature of stuttering.

2.2 Epidemiology and Course

Stuttering is characterized by disruptions in speech where the person stops or repeats certain sounds, words or phrases. The condition causes a severe disability for individuals who suffer from it, often resulting in avoidance and low self-esteem (Ginsberg, 2000; Karrass et al., 2006; Klompas & Ross, 2004; Messenger, Onslow, Packman, & Menzies, 2004). The sex ratio for stuttering is three males to every female; this imbalance is thought to increase as the population ages (Guitar, 2006).

Stuttering usually starts when speech and language development is at its peak, namely between 2 to 6 years of age. A prospective study conducted on 1619 children recruited at 8 months of age demonstrated that 8.5% of children suffered from stuttering at the age of three (Reilly et al., 2009). Fortunately, the majority of children who stutter recover spontaneously without any treatment. However, this spontaneous recovery is seen only in children prior to puberty. The persisting problem of stuttering tends to become more severe as a person ages without successful treatment. Therefore, adult stuttering is often referred to as chronic stuttering, indicating poor treatment outcomes in this group (see Guitar, 2006).

2.3 Childhood stuttering

2.3.1 Impact on children who stutter

At preschool, stuttering has been shown to evoke confusion, avoidance and other negative reactions by the peers of the stuttering child (Ezrati-Vinacour, et al., 2001; Langevin et al., 2009). Furthermore, children who stutter are often subject to negative stereotypes. These stereotypes have been found in the population of the general community, teachers, parents, and speech-language therapists (MacKinnon, Hall & MacIntyre, 2007).

Children and adolescents who stutter are much more likely to be bullied and victimized than their non-stuttering peers (Blood & Blood., 2004, 2007; Davis, et al., 2002). Moreover, these children find it difficult to make friends and are less likely to be popular. The impact is significant, and 83% of adults who stutter report retrospectively that they were bullied at school (Hugh-Jones et al., 1999). Given these implications, there is a strong need for speech treatments for children and adolescents who stutter.

2.3.2 Early interventions

The Lidcombe Program of early Stuttering Intervention (see Harrison, Onslow, & Rousseau, 2007) is the only speech therapy for stuttering children that has been tested in a randomized controlled trial (RCT). The Lidcombe program (LP) decreased stuttering in children under 6 years of age, compared to a waitlist control group, both in the short term (Jones et al., 2005) and in the long term (Jones et al., 2008). However, the LP has not yet been replicated in a RCT by an independent team of investigators, and therefore still holds the status of *possibly efficacious* in the minds of many researchers and clinicians, pending such replication (Chambless & Hollon, 1998).

The LP is based on behavioural principles, such as operant conditioning, to treat stuttering. The principal techniques used are positive reinforcement for speech free of stuttering, and moderate correction of the stuttered speech. The program is delivered by parents who attend a clinic with the stuttering child on a weekly basis (Harrison, Onslow, & Menzies, 2004).

In the first stage of the LP the parent learns five techniques that are divided into two categories. Firstly, acknowledgement, praise and a request for self-evaluation of speech fluency for the positive reinforcement of stutter free speech are taught. Secondly, when

the child stutters, the parents learn to acknowledge it, and request correction in a gentle manner. The goal is that the child enjoys these interactions. These techniques are taught in structured conversation, after which the parents are asked to use them on a daily basis (see Packman et al., 2010).

The second stage of the LP begins when the child has demonstrated both in the clinic and outside the clinic that stuttered speech has decreased to a low level. The goal of this stage is maintenance, where parents withdraw from the treatment and visits to the clinic are less frequent, given that stuttering remains infrequent or has stopped (see Packman et al., 2010).

As mentioned above, a RCT has been conducted to test the effectiveness of the LP. The trial included 54 children, and was conducted by Jones et al. (2005). The mean proportion of syllables stuttered by the experimental group (N=29) was 1.5% (SD 1.4), 9 months post-randomization. The control group (N=25), who did not receive any intervention, had a mean proportion of syllables stuttered of 3.9% (SD 3.5). This difference is double the minimum required for the effect size to be considered clinically significant. Furthermore, Jones et al. (2008) located these children 5 years after the treatment, when they were 7-12 years old. Twenty of the 29 children in the experimental group were located, and eight of the 25 children in the control group participated. The authors discovered that the majority

of the children in the treatment group had been able to maintain the gains from the LP, with only three (16%) children relapsing after 2 or more years. However, the majority remained below 1% syllables stuttered.

2.4 Adult Stuttering

2.4.1 Impact on adults who stutter

Stuttering which endures into adulthood is distressing, demoralizing and disabling. The intractability of the condition increases markedly after puberty. Therefore, adult stuttering is often referred to as chronic stuttering, reflecting the poor treatment outcomes in this group (Guitar, 2006). These individuals report severe limitation of their career options due to stuttering (Hayhow, Cray, & Enderby, 2002).

Iverach et al. (2009b) compared 92 stuttering adults with gender- and age-matched data from the Australian Bureau of Statistics (ABS) including 920 Australian household residents (Australian Bureau of Statistics, 2000). Both groups completed the Composite International Diagnostic Interview (CIDI-Auto-2.1) (World Health Organization, 1997).

This CIDI-Auto-2.1 is a psychiatric interview which is administered in a standardized manner on a laptop computer and generally takes 70 minutes to complete. It diagnoses mental health problems comprehensively and follows the criteria of the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (DSM-IV) (American Psychiatric Association, 1994) and the *International Classification of Diseases, Tenth Edition* (ICD-10) (World Health Organization, 1993). The reliability and validity of the instrument is adequate (World Health Organization, 1997).

The results from this comprehensive study by Iverach and colleagues were alarming. Individuals seeking treatment for stuttering had a six- to seven-fold increased probability of meeting a diagnosis of any anxiety disorder on the DSM-IV or ICD-10. In particular, people who stuttered had 16- to 34-fold increased odds of meeting the criteria for social phobia and 4-fold increased odds for generalized anxiety disorder on the DSM-VI and ICD-10. Moreover, adults who stuttered also had six-fold increased odds of meeting the ICD-10 criteria for panic disorder (Iverach et al., 2009b). In another study these authors discovered that the presence of any personality disorder was significantly higher among adults seeking treatment for stuttering compared to matched controls, demonstrating almost three-fold increased odds (Iverach et al., 2009c). Finally, people seeking treatment for stuttering had two-fold increased odds of experiencing a mood disorder during the previous 12 months on the DSM-IV or ICD-10, compared to the general public (Iverach

et al., in press). Given the above, it is indisputable that stuttering can continue to be associated with intense suffering in adulthood.

The current Vice President of the United States, Joe Biden, said in his speech at the American Institute for Stuttering in 2008: "We have all had serious things happen to us in our lives, but stuttering is the single most defining thing in my life". Mr Biden had achieved an extraordinary career in public life. He had also experienced profound personal loss when his wife and 2-year old daughter were killed in a car accident in 1972 (The Associated Press, 2008). Despite this, he still maintained stuttering as his defining feature. This demonstrates how intense the suffering from stuttering can be. Anecdotally, the quality of life for stutterers is decreased to such an extent that some report that they would rather lose a limb or get cancer than continue with their stuttering. Furthermore, it is not uncommon that people who stutter to make it their lifelong goal to cure stuttering in their community. Many of the leading researchers in stuttering around the globe have suffered from the condition themselves (e.g. Per Alm, Walt Manning, Barry Guitar).

2.4.2 Adult interventions

A widely disputed topic among speech pathologists worldwide concerns what treatment is the most effective in reducing stuttering among adults. "Fluency shaping" procedures

(also known as "speech restructuring") have been demonstrated as the treatments with the largest drop in stuttered speech, as indicated by objective measures (O'Brian, Onslow, Cream, & Packman, 2003; Ingham & Andrews, 1973). The essence of these treatments is a novel speech pattern that is incompatible with the stuttered speech. Fluency is achieved via operant conditioning. An example of a speech restructuring program is the Camperdown program (O'Brian, Onslow, Cream, & Packman, 2001; O'Brian et al., 2003).

The Camperdown program (see http://www3.fhs.usyd.edu.au/asrcwww/ for the treatment manual) consists of four stages. In the first stage, *Individual Teaching Sessions*, the stuttering client goes to the clinic on a weekly basis for 1-hour sessions. Clients learn to speak in a stutter-free manner by using highly unnatural speech to master the speech restructuring method. In the second stage, *Instatement of Stutter-free Speech within the Treatment Environment*, the goal is to improve the naturalness of the prolonged speech. Problem-solving strategies are taught in this second stage, and become a very large part of the third stage as well. This stage may be presented either individually or in a group format. To enter the third stage of the program, the client must demonstrate fluent conversational speech throughout a whole session. In the third stage, *Generalization of Stutter-free Speech into Everyday Situations*, strategies are taught for the generalization of the prolonged speech into everyday life. To reach the last stage of the program, individuals have to demonstrate that they can remain stutter free in various situations

outside the clinic. In that fourth and final stage, *Maintenance*, clients learn to problem-solve independently, without the assistance of the clinician. The aim of this phase is to prevent relapse.

A non-inferiority randomized controlled trial (D'Agostino, 2003) has demonstrated that the Camperdown program is equally effective when delivered face-to-face or via telehealth (Carey et al., 2010). However, no RCT results have been published on the efficacy of prolonged speech, with either waitlist-control or another placebo treatment. A RCT is necessary in order to be able to claim efficacy in a robust, scientific manner.

2.5 The problem of relapse

It is a well-established axiom of speech restructuring that only one third of individuals who stutter will benefit from treatments in the long term (Craig et al., 1995; Martin, 1981). Prolonged speech treatments are more effective with the milder forms of stuttering, leaving those with severe stuttering with less benefit and a higher likelihood of relapse (Andrews & Craig, 1988; Andrews, et al., 1983; Block, Onslow, Packman, & Dacakis, 2006; Craig, 1998; Guitar, 1976; Ladouceur, Caron, & Caron, 1989). A recent study demonstrated that of the one third who did not relapse after a successful speech restructuring treatment, none had any mental health diagnoses (Iverach et al., 2009a) (see Figure 2.1). In that study, in which thorough mental health assessment occurred prior to

speech treatment for 64 adults, it was demonstrated that the chance of relapse was associated with an increased number of mental health disorders of any type.

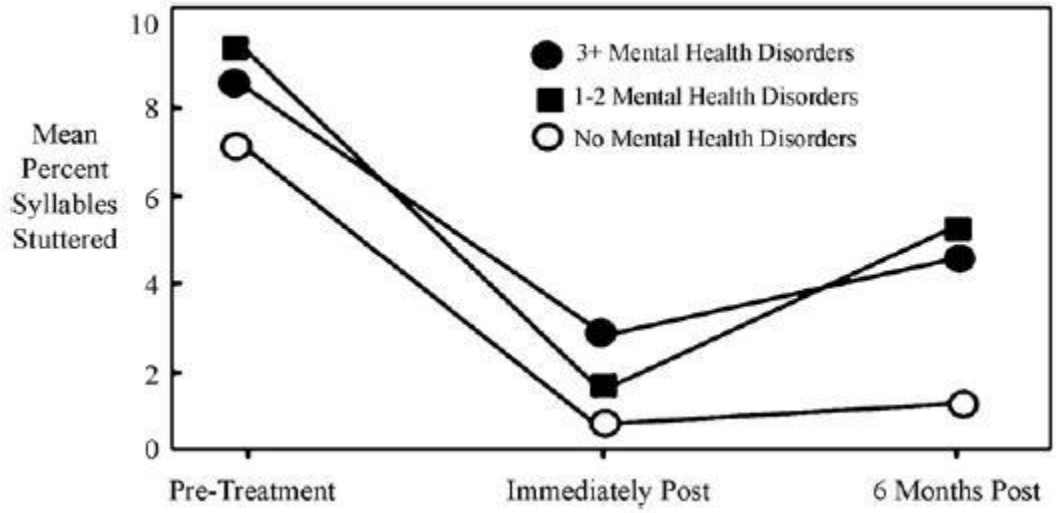

Figure 2.1: The relationship between benefits from restructuring speech treatment and mental health disorders. (Reproduced with permission from Iverach et al., 2009a.)

Adults who stutter have an increased chance of being diagnosed with an anxiety disorder in comparison to the general public. As mentioned above, they have 16-34-fold increased odds of meeting the criteria for social phobia (Iverach et al., 2009b). Furthermore, Menzies et al. (2008) found in a blind assessment that 60% of adults who stutter had the same diagnosis. With this in mind, it is vital to explore social anxiety in stuttering and develop treatments for this population. This may not only be beneficial for stutterers for the sake of curing mental health problems, but perhaps it can also facilitate better maintenance from state of the art speech treatments.

CHAPTER 3 – SOCIAL ANXIETY

3.1 Nature

Social anxiety disorder (SAD) or social phobia (SP) are characterized by an inflated threat perception in social situations (Alden & Taylor, 2004; Bögel & Mansell, 2004; Clark, D. M., 2001; Clark D. M. & McManus, 2002; Wilson & Rapee, 2004). Sufferers experience intense fear of negative evaluation and see amplified threats in being judged by others (Beck, Emery & Greenberg, 1985; Clark, D. M., 2001; Rapee & Heimberg, 1997; Wells & Clark, D. M., 1997). This exaggerated fear response has a marked impact on their relationships with others, in both public and private life (Keller, 2003; Schneier, et al., 1994; Schneier, Johnson, Hornig, Liebowitz, & Weissman, 1992; Simon et al., 2002; Turner, Beidel, Dancu, & Keys, 1986; Zhang, Ross, & Davidson, 2004). Sufferers fear, avoid, or endure with significant stress during the following: conversations, meeting new people, expressing a controversial opinion or disagreement, being assertive, speaking in front of a group, being the centre of attention, eating, drinking, or making mistakes in front of others (Antony & Rowa, 2008).

The socially anxious doubt their ability to make an impression on others, which is often a highly desired goal of these individuals. In other words, they seek reassurance of acceptance from others (Alden & Wallace, 1995). Therefore, people with SAD behave in an “innocent” manner. For example, they smile politely, agree to a lot of things, show increased head nodding, and make greater use of excuses and apologies (Edelman, 1987; Leary, 1983; Leary, Knight, & Johnson, 1987; Patterson & Ritts, 1997; Schlenker, 1987).

The concept of SAD was first adopted into the DSM-III in 1980 (American Psychiatric Association, 1980). At the time it was classified as a phobic disorder, along with other phobias such as agoraphobia and other specific phobias (Marks & Gelder, 1966b). However, at the time, several agoraphobic symptoms were included in the social phobia diagnosis, such as fainting, which were later removed due to an important study by Amies, Gelder and Shaw (1983). Since then, little has changed with regard to the official status of SAD, but a large body of inconsistent literature has been published on its subtypes (see Hofmann, Alpers, & Pauli, 2009, for an overview).

3.2 Prevalence

SAD is common in the general population, with lifetime prevalence rates in Western countries ranging between 7% and 12% (Furmark, 2002; Kessler et al., 2005; Ruscio et al., 2008). The range of reported cases in the various community studies can be attributed largely to the use of different assessment instruments (Antony et al., 2008).

SAD is a phenomenon that is widespread around the globe. In Western, individualistic societies, the fear mainly concerns embarrassing oneself in front of an audience (Heckelman, & Schneier, 1995; Hofmann, et al., 2009; Hofmann & Barlow, 2002). However, a different presentation of SAD has been found in cultures that emphasize collectivism rather than individualism (Chapman, Mannuzza, & Fyer, 1995). In collectivist cultures, a special subtype of social anxiety has been identified, known as Taijin Kyofusho Syndrome (TKS) (Chapman et al., 1995). This distinctive subtype is differentiated from Western SAD in that it manifests

itself by the fear of offending others. For example, common in TKS is the fear of emitting unpleasant odours. Several authors have pointed out that such fears would be categorized differently in the DSM-IV if presented in Western cultures (Kim, Rapee, & Gaston, 2008).

The problem of SAD is often consistent throughout an individual's lifetime, and therefore determining the age of onset is a complicated matter (Rapee, Schniering, & Hudson, 2009). Data on childhood social anxiety is scarce (Rapee et al., 2009), but several authors report that onset is typical in the mid-teens or early adulthood (Antony & Rowa, 2008; Antony, Federici, & Stein, 2009; Hofmann et al., 2009).

The gender distribution of those who seek treatment for SAD is equal (Yonkers, Bruce, Dyck, & Keller, 2003). In some lifetime prevalence studies females have been shown to be more likely to have SAD than males, but this is a highly controversial finding (Fehm, Pelissolo, Furmark, & Wittchen, 2005; Herbert & Dalrymple, 2005). A study conducted over the course of 8 years demonstrated that of all the anxiety disorders, SAD was the most chronic and unremitting of the conditions (Yonkers et al., 2003).

Severe SAD continues to be severe if left untreated. Furthermore, SAD is known to be persistent across all levels of severity (Reich, Goldenberg, Vasile, Goisman, & Keller, 1994). As pointed out by Hofmann and Otto (2008), untreated SAD can have a severe impact on the individual's private and professional lives (Davidson, Hughes, George, & Blazer, 1993; Liebowitz, Gorman, Fyer, & Klein, 1985; Schneier et al., 1994; Schneier, et al., 1992; Stein

& Kean, 2001; Stein, Torgrud, & Walker, 2000; Stein, Walker, & Forde, 1996). Finally, given the disability and nature of SAD, it has been highly correlated with substance abuse, bulimia nervosa, mood disorders and other anxiety disorders (Antony et al., 2009).

3.3 Origin: Learning models

Environmental factors in threat perception are based on learning experiences one encounters when growing up. For example, home and school lives are full of learning experiences, and one subsequently develops fears and anxieties based on these moments. In psychology the acquisition and maintenance of these learning processes have been described both by behavioural and cognitive models.

Both classical conditioning and operant conditioning are accommodated for within the behavioural framework. The first experimental demonstration of classical conditioning was in Russia by Ivan Pavlov (1927). He repeatedly rang a bell immediately before feeding his dog, which led to a conditioning of the dog's salivary reflex. Subsequently, when the dog heard the bell without any food present, the conditioned salivary reflex was activated. In other words, an outside stimulus (the bell) had a direct impact on a physiological mechanism (digestion) by repeated pairing of the conditioned stimulus and the unconditioned stimulus (Pavlov).

In classical conditioning there is a *conditioned stimulus* (CS), which is a previously neutral stimulus that evokes a *conditioned response* (CR) after repeated pairings with an *unconditioned stimulus* (US). The US had previously evoked an *unconditioned response* (UR). For Pavlov's dog the bell was the CS, the food was the US, and salivation was the UR which became the CR after the repeated pairing.

In operant conditioning, or *response-stimulus* conditioning, an association is formed between an animal's behaviour (*response*) and the consequence (*stimulus*) of that behaviour. There are four possible consequences of a given behaviour, namely positive and negative reinforcement and positive and negative punishment. For example, if a dog sits down (*response*) when hearing the sound "sit", and subsequently gets food (*stimulus*), the sitting behaviour may increase. If this occurs, *positive reinforcement* (*R*+) is said to have occurred. Secondly, if the dog sits down (*response*) when hearing the sound "sit", and food gets taken away (*stimulus*), the sitting behaviour may decrease. This is called *negative punishment* (*P*-). Thirdly, if the dog sits down (*response*) when hearing the sound "sit" and water is sprayed at it (*stimulus*), then the sitting behaviour may decrease. This is called *positive punishment* (*P*+). Finally, if the dog sits down (*response*) when hearing the sound "sit", and the water spraying stops (*stimulus*), the sitting behaviour may increase. This is known as *negative reinforcement* (*R*-) (Flora, 2004).

Pavlov's classical conditioning became central to modern clinical psychology when John B. Watson demonstrated fear learning in his unethical but fascinating "Little Albert" experiment (Watson & Rayner, 1920). Little Albert was chosen for this experiment because he was a

child who “practically never cried”. Prior to conditioning Albert showed no fear response to any of the animals (neutral stimulus) presented in the experiment. However, after pairing a loud sound (US) with a white rat (CS) repeatedly, he became extremely fearful (UR/CR) and avoided the rat (CS) when later presented alone with no loud tone (US). Furthermore, when presented with a white rabbit his fear learning had generalized to this different animal.

Although classical conditioning provides some insight into the acquisition of phobias, it lacks one fundamental component for the understanding of learning fear. It does not explain why phobias persist despite pairing with positive stimuli. To address this anomaly, Mowrer (1960) introduced the two-factor theory of fear learning. He proposed that fear was learned by the means of classical conditioning, but then maintained by the means of operant conditioning. In other words, the behavioural avoidance observed in social anxiety and other anxiety disorders which reduces fear and anxiety in the short term, operates as *negative reinforcement* (*R+*) in the long run, maintaining the anxiety. In this way fear learning is prevented from being unlearned and the anxiety continues.

3.4 Origin: The biological models

Gilbert (2001) has argued that threat perception in social anxiety evolved to protect humans from bullying, injury and killings. These were commonplace in early civilizations. Therefore, being wary of perceived social threat may have had an adaptive advantage. However, social anxiety is evoked when people fear being unable to gain approval, interest or investment from others in various social relationships. For example, they may fear being unable to attract

sexual attention. Since human beings moved from the cave into the skyscraper, it is possible that some early primitive survival mechanisms may have become maladaptive in modern times. This view is often referred to as Darwin's account of anxiety, where the theory of evolution is used to explain its origin.

As reviewed by Menzies and Clarke (1995), early theorists (i.e. Seligman, 1971) understood Darwin's account of anxiety and phobias as still requiring some Pavlovian conditioning. Seligman's (1971) preparedness model suggested that evolution led to prepared associations between some CSs and some USs, so that learning could take place swiftly. Seligman proposed that relatively few associative learning trials were needed for these associations to be formed. Following this model, therapists traditionally insisted that patients must have experienced at least one bad encounter with their fear-relevant stimulus in the original development of their phobia. However, Menzies and Clarke (1995) pointed out that this was an incorrect interpretation of the evolutionary account, since Darwin had reported that human beings were likely to have been born with innate fears. The role of learning from a Darwinian point of view was to unlearn innate fears if they proved irrelevant in a given environmental setting. It is possible that these innate fears served some purpose for the survival of the species 60,000 years ago. For example, it is conceivable that early humans who were anxious while walking through certain areas in East Africa had an evolutionary advantage. Dangerous predators were common, and a certain level of anxiety would help increase and maintain one's guard against these animals.

This model of innate fears became known as the non-associative model (see further, Menzies and Clarke, 1995). It can be understood as learning that has been encoded in the human genome. Consistent with this account, Poulton, Waldie, Menzies, Craske, and Silva (2001) have shown that the role of learning in height phobia is to unlearn inbuilt associations through early exposure to climbing equipment. It appears that no single gene has been found that can explain the complex nature of SAD (Antony et al., 2008). Yet some twin studies have confirmed that one can be born with a genetic predisposition towards developing an anxiety disorder (Hettema, Prescott, Myers, Neale, & Kendler, 2005). Another large-scale twin study has demonstrated that personality traits such as low extroversion and high neuroticism are risk factors for developing social anxiety (Bienvenu, Hettema, Neale, Prescott, & Kendler, 2007).

Infants who cry a lot and sleep little in their first 12 months of life have an increased chance of developing increased inhibition from the ages of 2 to 6 years. Inhibition is characterized by the child who wants to maintain close proximity to safety figures, shows marked distress when faced with novelty, and in general exhibits restricted social behaviours (Rapee et al., 2009). These behaviours in early life are highly correlated with social anxiety.

When the brain activation of socially anxious individuals was compared to that of healthy individuals, specific brain areas showed different activation (Straube, Mentzel, & Miltner, 2005). In particular, the former group showed increased activity in response to human faces, regardless of facial expression, in an area called the extrastriate visual cortex. Furthermore, increased activity was observed in a brain area called the amygdala, which is important for

the processing of socially threatening stimuli and stimuli that signal safety and acceptance. Finally, an area known as the insula seems to be triggered more actively in people with SAD in response to the sight of both happy and angry faces, indicating that the insula is strongly related to the threat relevance of incoming information.

The biological accounts of social anxiety mentioned above are important. However, it is impossible to discuss social anxiety with respect to the biological context only. Most theorists agree today that biology and environment interact, and both contribute to the development of the socially anxious person. Unlike traits encoded into the human genome, certain learning experiences must be experienced first-hand. For example, certain parental styles influence a child's development. Parents who are overprotective, nervous, irritable, depressed, controlling, and who fail to encourage independence in their children are more likely to have socially anxious children (see a review by Rapee & Hudson, 2009). With regard to the peer group, bullying during school years is highly correlated with social anxiety (Gladstone et al., 2006; McCabe et al., 2003; Roth et al., 2002). The consequences of these experiences are best understood by looking at the cognitive model of social anxiety.

3.5 Origin: Cognitive models

The original cognitive model for SAD was introduced by Beck, et al. (1985) in their discussion about models that explain fear and anxiety in terms of well defined cognitive constructs. Built on these grounds, two cognitive models (Clark D. M. & Wells, 1995; Rapee & Heimberg, 1997) are the current state of the art in cognitive theory of SAD. Both these

models emphasize the assumption of perverted information processing in social situations by individuals with SAD. These individuals believe negative assumptions such as “I’m weird” or “I’m boring”. Consequently, these beliefs “pollute” the individuals’ social situations. Also, both models theorize that people with SAD see negative evaluation as catastrophic. Therefore, they avoid this evaluation at all costs. Furthermore, a similar feature of the models is that both of them describe a feedback loop that maintains negative predictions, distorted self-beliefs, and social anxiety. Both models agree on the destructiveness of general avoidance. Finally, Clark D. M. and Wells refer to safety behaviours, which are unhelpful to social anxiety. Similarly, Rapee and Heimberg describe the same phenomena, using the terminology “subtle behaviours” (Antony et al., 2008).

3.5.1 Safety behaviours (subtle behaviours)

Safety behaviours are overt or covert activities that individuals with SAD use in the attempt to prevent a social catastrophe from occurring. The definition of safety behaviour is in its function. Consequently, as pointed out by McManus, Sacadura, and Clark D. M. (2008), any behaviour and also its opposite behaviour can function as safety behaviours. For example, both talking more or talking less can potentially function as safety behaviour to prevent the social fear of appearing boring, depending on the individual and the context.

The distinction between adaptive coping behaviours and maladaptive safety behaviours is sometimes blurred. The same behaviour can function both as adaptive coping behaviour and as maladaptive safety behaviour. The category which within the behaviour falls depends on

its intended purpose, the underlying belief, and the consequences from the situation. Therefore, a detailed idiosyncratic assessment is needed of the individual's motivations in order to be able to distinguish between the two. As Thwaites and Freeston (2005) have pointed out, many patients develop safety behaviours which they have learned from health professionals (e.g. breath control or distraction techniques) or through self-help books, in the belief that they are adaptive coping strategies. However, these behaviours may be maintaining their social anxiety.

Individuals, with or without social anxiety, do not differ in their frequency of using safety behaviours. However, only in SAD have safety behaviours been found to have a causal link with negative beliefs (Okajima, Yoshihiro, Chen, & Sakano, 2009). Furthermore, by manipulating safety behaviours and self-focused attention, social anxiety can be increased or decreased, indicating a causal role of safety behaviours in SAD (McManus et al., 2009).

There has been some evidence as to the beneficial use of safety behaviours in snake phobia treatment research (Milosevic & Radomsky, 2008), where individuals use safety gear in early stages of exposure tasks. However, this does not help to explain the problem of and the role of safety behaviours in SAD. Furthermore, a review arguing for the judicious use of safety behaviours (Rachman, Radomsky, & Shafran, 2008) did not present any supportive data within the realms of social anxiety. Finally, a recent review of the role of safety behaviour in anxiety disorders supports the increasingly accepted view that safety behaviours are detrimental in the long run (Parrish, Radomsky, & Dugas, 2008).

Currently there is no evidence for any direct helpfulness of safety behaviours in SAD. On the contrary, several studies have reported the detrimental effect of such safety behaviours in social situations (Kim, 2005; McManus et al., 2008; Morgan & Raffle, 1999; Wells et al., 1995). Consequently, the current view is that safety behaviours have a detrimental effect on social anxiety, and can interfere with standard cognitive behaviour therapy techniques by inhibiting testing of hypotheses for socially anxious individuals. Finally, an important study demonstrated in a controlled experiment that the use of safety behaviours preserves threat belief (Lovibond, Mitchell, Minard, Brady, & Menzies, 2009). In this study, a neutral stimulus was paired with electric shock using classical conditioning. Participants were also taught to press a button to avoid the shock. The experimental group was given the opportunity to make the avoidance response during extinction training, whereas the control group was not. When the fear stimulus was tested without the shock, the control group showed normal extinction both on self-report measures and skin conductance, whereas the experimental group demonstrated "protection from extinction". This is an extremely important result, as it is analogous to the way threat beliefs can be preserved despite environmental opportunities for extinction in SAD.

3.6 Rapee and Heimberg's model

Rapee and Heimberg's (1997) model of social anxiety describes SAD as a reaction to an *audience*. The authors argue that without an audience individuals do not feel socially anxious. Furthermore, they suggest that individuals create a mental representation of the way they believe they appear to an audience. These images are formed on the basis of self-image from memory, pictures, physical symptoms and social feedback. However, importantly, the images

in Rapee and Heimberg's model are different from those described in the Clark D. M. and Wells (1995) model. In particular, the latter authors argue that people with SAD see these images as if they were watching them on a TV screen, and the former describe them as mental representations.

In their model, Rapee and Heimberg (1997) place strong emphasis on threat perception in social situations among individuals with SAD. Without direct feedback, people with SAD distort their experiences and put a negative spin on the situation, which results in confirming their negative interpretation. Also, people with SAD perceive increased threat because of their belief that others hold extremely high expectations of them. Finally, due to the interference of this anxiety in social situations, these people often create self-fulfilling prophecies, and thereby receive objective evidence that they are "weird" or "boring".

3.7 Clark D. M. and Wells Model

People with SAD hold the belief that they appear to others much worse than they actually do. The model of social anxiety by Clark D. M. and Wells' (1995) explains in great detail how they believe social anxiety is maintained. Furthermore, it explains how it is possible to maintain social anxiety despite countless disconfirming experiences. Figure 3.1 demonstrates the information processes that occur when people with SAD enter a social situation, according to the Clark D. M. and Wells model.

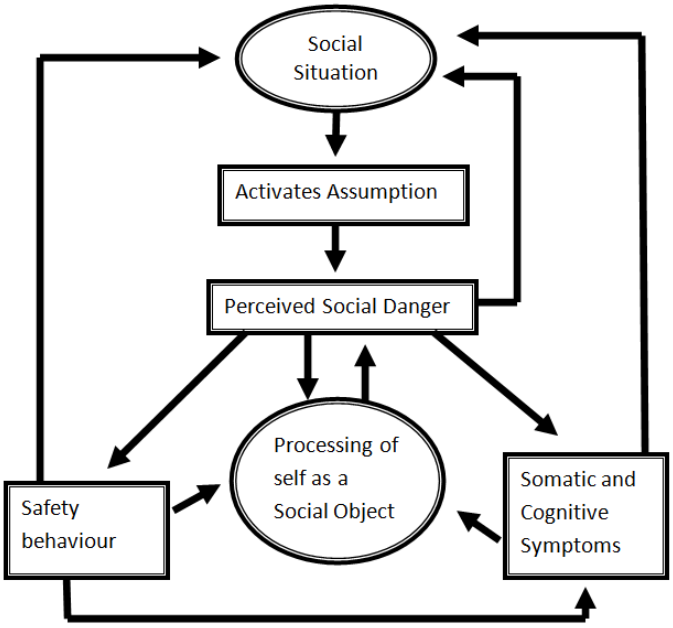

Figure 3.1. Adapted from Clark D. M. & Wells, 1995; Clark, D, M., 2000

The model is based on the presupposition that early learning experiences, such as bullying or a difficult upbringing, create sets of assumptions (Clark, D. M., 1999). Those assumptions lead people with SAD to read social situations as dangerous.

The series of assumptions can be split into three distinct categories (Clark, D. M., 2005). The first is *Extremely high standards for social performance,* such as "I should always be entertaining to be around" or "I should always sound intelligent". The second is *Conditional beliefs concerning the consequences of performing in a certain way,* such as "If people get to know the *REAL* me, they won't like me" or "If I stutter I will never be successful". Finally, there are the assumptions that fall in the category of *Unconditional negative beliefs about the self,* such as "I'm weird", "I'm stupid" or "I'm boring". According to Clark, D. M. (1997), all the above categories of assumptions trigger an "anxiety program" which consists of three intertwined mechanisms, namely *Somatic and cognitive symptoms, Safety behaviours* and *Processing of self as social object* (see Figure 3).

The *Somatic and cognitive symptoms* are reflexive anxiety symptoms which occur as a response to the perception of danger. They may be either purely physiological symptoms such as increased heart rate, blushing, trembling, sweating, hot flushes and shortness of breath, or cognitive symptoms such as difficulty concentrating and mental blanks. These symptoms often pollute the social situation, which in turn activates additional underlying assumptions.

Safety behaviours, as discussed above, are cognitive and behavioural strategies that are used to prevent catastrophes from occurring. An example is rehearsing one's answers in one's head before speaking. According to the model illustrated in Figure 3.1, these can affect the cognitive model in three different ways. First, safety behaviour can pollute the social situation. For example, people who are rehearsing what they plan to say in their head may look preoccupied, and as a result people may assume they are uninterested. Second, safety behaviour adds to the *Processing of self as a social object* image because the individual simply misses out on what is happening. Finally, it adds to the *Somatic and cognitive symptoms* since when people are engaging in this mental rehearsal they are more likely to experience somatic and cognitive symptoms such as sweating, having difficulty concentrating, or experiencing a mental blank.

Processing of self as social object is central to the Clark, D. M. and Wells (1995) model as it is the key maintenance factor for social anxiety. The authors propose that when an individual with SAD enters a social situation there is a sudden shift of attention and a specific negative self-processing is activated. This happens when the individual perceives threat relating to

"social danger", such as negative evaluation by others; incidentally, a detailed self-monitoring system is activated. However, this system is extremely negatively distorted, yet these individuals use the information from this system to hypothesize how they come across to others and what others must be thinking about them. A significant problem is that this system is a closed one, so that these individuals use the evidence they gather to support their underlying unhelpful assumptions, and therefore constantly perceive danger signals in their social environments. Furthermore, they actually *see* themselves as if they were watching themselves from the observer perspective. Because of this, they fail to recognize that other people's responses do not support their assumptions, even though this may be crystal clear to an outsider. However, socially anxious individuals fail to recognize this is due to their processing system, which is referred to as *processing of self as a social object* (Clark, D. M. 2005). In summary, attentional deployment is central to the maintenance of social anxiety.

Many correlation and experimental findings support the assumption that biased information processing for social threat exists in social phobia (as cited in Beck & Clark, D. A., 2010; for reviews see Alden & Taylor, 2004; Bögel & Mansell, 2004; Clark, D. M., 2001; Clark D.M. & McManus, 2002; Wilson & Rapee, 2004). As shall be seen in the next chapter, contemporary cognitive models like those of Rapee and Heimberg (1997) and Clark D. M. and Wells (1995) have advanced the CBT treatment outcomes for SAD.

CHAPTER 4 – THE TREATMENT OF SOCIAL PHOBIA

A major achievement in the field of clinical psychology has been the development of evidence-based practice. Modern-day evidence-based psychological treatments for psychopathology were introduced in three stages. First, behaviour therapy (BT) appeared around the same time both in the United Kingdom and the United States, from 1950 to 1970. Second, cognitive therapy (CT) was developed in the United States during the mid-1960s. Finally, BT and CT merged into Cognitive Behaviour Therapy (CBT) in the 1980s. Since then, CBT has advanced considerably in North America, Europe and Australia (Rachman, 2009). Today, the terms CBT and CT are used interchangeably.

This chapter contains an overview of evidence-based treatment options for the treatment of social phobia. First, an overview is presented of what evidence-based treatments include. Second, state-of-the-art drug treatments are discussed. Third, an exploration of BT for anxiety is delivered in a historical context. Fourth, CT or CBT for treating SAD is presented. Fifth, an overview of evidence for individual components of CBT is discussed. Finally, treatments of social phobia for those who stutter are reviewed.

4.1 Evidence-based practice

Currently there is an overabundance of advice on how to succeed in relationships, business, and all manner of human endeavours. A wide range of seminars, workshops, and self-help groups are advertised in the media, and self-help books can be found in all large bookshops.

Furthermore, a high proportion of professionals have been caught up in this movement, and use treatments that are not supported by empirical evidence. In fact, a recent content analysis of advertisements for psychotherapy workshops in the U.S. revealed that only 8% were advertising workshops for evidence-based methods (Cook, Wiengardt, Jaszka, & Weisner, 2008).

Many of the "treatments" found in self-help books rely primarily on anecdotal evidence, citing a small number of case studies where individuals have benefited enormously. A typical title of a self-help book with anecdotal evidence is *Successful small talk: Learn to be open, interesting and intelligent*. The purpose of such a book is typically to advise individuals on how to better manage their social relationships and situations. However, these books are not normally written by qualified professionals. Furthermore, in many cases the advice given is highly likely to maintain social anxiety in the reader. The reason for this is that the books often promote safety behaviours that function to maintain anxiety (see the discussion in Chapter 3.5.1).

Humans' acceptance of anecdotal evidence is not new; in fact, it appears to be a fundamental aspect of the way the human mind makes connections in the external world (Hood, 2009). A notable example within psychology is Freud's extensive use of case studies, which were very influential. This type of evidence was relied upon heavily for many years in developing treatment for mental illness.

In recent times the situation with respect to anecdotal evidence has changed, and there are widely accepted ways to define the difference between anecdotal evidence and empirically supported evidence. A common convention to date is to follow the Chambless and Hollon (1998 p. 7) criteria for evidence-supported therapies (EST) in clinical psychology. They state:

> The term we have elected to use, *empirically supported therapies,* is deliberately different from *empirically validated therapies,* the term used by the American Psychological Association Division 12 Task Force (1995), for two reasons: (a) to make clear that the criteria for the two labels are different and (b) to avoid the unfortunate connotation, to some, of the phrase *empirical validation* (to wit, that the process of validation has been completed, and no further research is needed on a treatment; see Garfield, 1996).

The Chambless and Hollon criteria for EST include three categories that all refer to randomized controlled trials (RCT). First, if therapy is to be considered *efficacious and specific* it must satisfy the following criteria: "statistically significantly superior to pill or psychological placebo or to an alternative *bona fide* treatment in at least two independent research settings". Second, for a therapy to be considered *efficacious* it has to be proved to be more beneficial than no treatment in at least two independent settings. Finally, a treatment is considered *possibly efficacious* if there is only one study supporting the therapy's efficacy, or if all the research has been conducted in the same setting. An excellent overview, using these guidelines, of RCTs for treating anxiety disorders performed in the last 40 years was presented by Lars-Göran Öst (2008a). Ost suggested that many popular and widely used new treatment approaches (e.g. "acceptance and commitment therapy") do not meet the standards of evidence suggested by Chambless and Hollon (see further Ost, 2008b, 2009; Gaudiano,

2009). To keep the review evidence-based, the remainder of this chapter deals with treatments that fulfil the Chambless and Hollon (1998) criteria.

4.2 Drug treatments

The state of the art in pharmacotherapy for symptom reduction in SAD is selective serotonin reuptake inhibitors (SSRIs). These include Fluvoxamine, Sertraline, Paroxetine, Fluoxetine, and Escitalopram (see Van Ameringen, Mancini, & Patterson, 2009, for review). In the literature, pharmacotherapies for SAD have mostly been compared against a group format of CBT (GCBT). The results from these comparison studies indicate that pharamacotherapies and GCBT are equally effective post-treatment. However, preliminary data demonstrates that CBT may be more beneficial than drug treatments in the long term, with lower relapse rates (Hollon, Stewart, & Strunk, 2006; Liebowitz et al., 1999; Van Ameringen et al., 2009). Furthermore, some evidence suggests that individual CBT is more effective than GCBT (Stangier, Heidenreich, Peitz, Lauterbach, & Clark, D. M., 2003).

Two studies have compared pharmacotherapy with individualized cognitive therapy (CT). Socially anxious patients receiving CT showed superior improvement on measures for social phobia, both immediately post-treatment and at 12-month follow up, when compared with self-exposure plus Fluoxetine. Furthermore, during the course of the treatment there was a third condition, which was a placebo plus self-exposure. No difference was found between the placebo group and the Fluoxetine plus self-exposure group (Clark D. M. et al., 2003). In the other study, CT was superior to Moclobemide post-treatment and at 2-month follow-up

on measures for social phobia. These gains from CT were also maintained at 15-month follow up. Furthermore, at post-treatment and 2-month follow-up there were no differences between Moclobemide and a placebo condition (Oosterbaan, Van Balkom, Spinhoven, & van Dyck, 2001).

Drug treatments need to be guided by a biological understanding of the processes in SAD or its symptom picture. One attempt at using advanced accounts of the biochemical processes involved in learning to enhance the treatment of SAD can be seen in trials of a drug called Oxytocin. This substance has been shown to facilitate extinction of feared stimuli in animals (Jørstad-Stein & Heimberg, 2009). Two promising double-blind RCT trials demonstrated an augmentation of exposure treatments for SAD by using Oxytocin (Guastella et al., 2008; Hofmann et al., 2006). However, this enhancement of exposure therapy did not seem to hold in the long run (Guastella, Howard, Dadds, Mitchell, & Carson, 2009). The authors proposed that Oxytocin subtly enhanced the cognitive processing of a social threat in a positive way, but that there was no evidence that this changed psychopathology in the long term.

Despite the fact that some SSRIs have been shown to be equally effective to GCBT, several limitations should be considered. First, side-effects of medication are a well established phenomenon. Common symptoms include weight increase, problems with concentration, hormonal imbalance, skin changes, nausea, and agitation (see Antony & Swinson, 2008). For this reason, many individuals decide not to take medication for their mental health problems. Moreover, maintenance of the gains from drug treatments for SAD has not been demonstrated after the individual stops taking the medication (Haug, et al., 2003). Given

these objections, and the fact that drug treatments are beyond the scope of the present thesis, the rest of this chapter addresses established psychological treatments for SAD.

4.3 Historical background of psychological treatments for anxiety

Classical conditioning by Ivan Pavlov paved the way to study psychological therapies as a science (see Chapter 3.3). His research on learned behaviours, studied in a controlled experimental environment, was the foundation of empirical clinical psychology. Pavlov's classical conditioning became central to behaviour therapy, with the famous "Little Albert" study of John Watson and Rosalie Rayner (see Chapter 3.3). Fear learning was established with the goal of later demonstrating extinction learning in the laboratory.

Several authors continued to work with this Pavlovian understanding of fear learning, such as Mary Cover Jones (1924). However, it was not until Wolpe published his findings with cats that Pavolvian-based strategies for the treatment of anxiety disorders were systematically developed. Wolpe (1969) wrote, "Systematic desensitization is the breaking down of neurotic anxiety-response habits in a piecemeal fashion." Wolpe developed his exposure technique based on his experiments on cats in his laboratory (Wolpe, 1948, 1952, 1958, cited in Wolpe, 1969). He observed that after conditioning tone and shocks in cats, it was particularly challenging to generate the normal process of extinction. However, Wolpe discovered that the cats were less anxious in experimental rooms where the initial conditioning had not occurred. He then, in a systematic way, progressively introduced the cats to rooms more and more

similar to the initial room. He continued this until the symptoms of anxiety had been removed and extinction had occurred.

The next step Wolpe took in applying this knowledge to anxiety was to use "assertiveness training". He argued that lack of training in standing up for oneself when criticized by others produced anxiety, and this anxiety inhibited the expression of resentment. Therefore, he proposed that teaching assertiveness or outward expression of emotion would reciprocally inhibit the anxiety and thus suppress it (Wolpe, 1958). However, he soon found that this did not apply to all the different types of anxiety. Finally, he also incorporated Jacobson's (1938) "progressive muscle relaxation" into his treatments. He used Jacobson's relaxation technique to get his patients to relax before he started the in vivo exposure. This was another means of using the principles of reciprocal inhibition to deliver psychotherapy.

Given the practical difficulty of in vivo exposure, Wolpe soon started using imagery exposure instead. He found that using systematic desensitization in imagination as an exposure technique was as useful as in vivo exposure for patients in treating anxiety in real life situations. Wolpe followed the Pavlovian root of the technique, and presented only one stimulus per category in each session.

Important research into this new technique of systematic desensitization was conducted in the following years by Wolpe himself (1954, 1958, 1961). Furthermore, the work was soon extended by other researchers such as Lazarus (1961). Lazarus treated a group of phobic

patients using systematic desensitization, and compared it with more conventional therapy at the time, which was based on the group dynamic. Thirteen of the 18 patients who received desensitization were recovered at post-treatment, and at 9-month follow up only three had relapsed. Only two patients in the group that received the conventional therapy were symptom-free at post-treatment.

The first randomized controlled trial that was performed on the treatment of the anxiety disorders was executed by Lang and Lazovik in 1963. In their experiments they used non-clinical college students who were afraid of snakes. In this study they demonstrated an increased reduction in fear and overt avoidance using desensitization, both post-treatment and at 6-month follow up, as compared to the non-participating controls. This was followed by Marks and Gelder (1966a), who established efficacy in a RCT on a clinically diagnosed patient group using systematic desensitization.

In these early years, other forms of behaviour therapy treatment emerged, and were seen as competitors to the original treatment by Wolpe. These treatments included flooding (Malleson, 1959) and modelling (Bandura & Barab, 1971), and demonstrated equal or better outcomes when compared with systematic desensitization (McGlynn, Smitherman, & Gothard, 2004). However, Marks (1973, 1975) pointed out that all the above methods exposed patients to their fear signal, and argued that this was the vehicle to their success. Therefore, all the above treatment strategies can be referred to as exposure treatments for the anxiety disorders.

Exposure treatment has been demonstrated to be more effective than a waitlist control group or placebo in several trials (Butler, Cullington, Munby, Amies, & Gelder, 1984; Hope, Heimberg, & Gelder, 1995; Merch, 1995; Salaberria & Echeburua, 1998; Turner, Beidel, & Jacob, 1994). These gains have been shown to be retained in follow up assessment (Butler et al., 1984; Hope et al., 1995; Salaberria et al., 1998). Furthermore, exposure has been compared to relaxation training (Al-Kubaisy et al., 1992; Alström, Nordlund, Persson, Hårding, & Ljungqvist, 1984), demonstrating superior reduction in anxiety. Therefore, according to the Chambless and Hollon (1998) criteria, exposure treatment for anxiety holds the status of *efficacious and specific*. Finally, exposure treatments have been shown to demonstrate cognitive change without any cognitive intervention per se (Merch, 1995; Salaberria et al., 1998). However, today exposure treatments are rarely used without any cognitive restructuring in the treatment of SAD. This is due to the fact that the core construct in SAD is fear of negative evaluation, which is a cognitive construct (Magee, Erwin, & Heimberg, 2009).

4.4 Cognitive behaviour therapy for the treatment of social phobia

In 1966, Marks and Gelder were the first to describe the syndrome of social phobia. It was not until 1980, however, that social phobia became an official diagnosis in the third edition of the *Diagnostic and statistical manual of mental disorders* (APA, 1980). This original diagnosis was excessively broad, as it included several agoraphobic fears (Amies et al., 1983). Therefore, in the fourth version of the *Diagnostic and statistical manual of mental disorders* (APA, 1994), the diagnosis of social phobia was narrowed to the cognitive construct of anxiety related to the scrutiny and judgements by other people. Importantly, this

construct needs to be targeted by identifying the different information processes and dysfunctional beliefs related to SAD. Taken together, this acknowledgment led to the birth of CBT as a treatment for SAD, which has since been widely established to be *efficacious and specific* (for overviews see Beck & Clark D. A., 2010; Butler, Chapman, Forman, & Beck, 2006; Jørstad-Stein & Heimberg, 2009; Lampe, 2009; Ponniah & Hollon, 2008; Öst, 2008).

The most influential texts on the treatment of social phobia that fall within the wide framework of CBT come from Aaron Beck, David M. Clark and Adrian Wells. The consensus among these authors is that emotional problems all stem from faulty thinking and information processing. These processes need to be identified and corrected in a targeted manner. The following section describes common strategies of the cognitive treatment approaches used by these authors.

Treatment goals for CBT for social phobia include the following: to reduce anticipatory anxiety, to minimize excessive self-consciousness, to eliminate safety strategies, to improve tolerance to anxiety and reduce inhibition, to eliminate post-event rumination, and finally to modify core beliefs (Beck & Clark D. A., 2010). They identify six treatment components as essential for achieving these goals, and refer to the following texts: Butler and Wells (1995), Clark D. M. (2001), Turk, Heimberg, and Magee (2008), and Wells (1997) (see Beck & Clark D. A. 2010).

Strategy 1: Education, goal setting and hierarchy construction. Patients are educated about the cognitive model of social anxiety, such as by emphasizing processes that play a role before, during and after social situations. In this phase a fear hierarchy is constructed and goals of the treatment are identified.

Strategy 2: Cognitive restructuring of anticipatory anxiety. Biased threat evaluation, in which the client engages prior to social situations, is identified with Socratic questioning. Then the faulty information processing is challenged with strategies such as evidence gathering, cost-benefit analysis and decatastrophising. This is normally followed by hypothesis testing assignment in the real world.

Strategy 3: Heightened self-focused attention: use of role-play feedback. This step involves role playing games, including the comparison of normal internally focused socially anxious reaction vs. externally focused attention in social situations (Clark, D. M., 2001). This process informs the patient of the causal role of excessive self-focus and use of safety behaviours (see Chapter 3.7). A videotape is also used to enhance the accuracy of feedback in this exercise.

Strategy 4: Cognitive restructuring of faulty threat appraisals during exposure. This step involves the same strategies as those used in Strategy 2. However, they are applied during role plays and in real-life social situations. Underlying core beliefs are explored as well.

Strategy 5: Exposure to social threat. Hypothesis testing is performed in the form of behavioural experiments to test out the threat perceived by the socially anxious individual. These experiments take place in real-life settings for the client.

Strategy 6: Cognitive interventions for post event processing. For individuals who engage in significant rumination after social situations, it is important to do a cost-benefit analysis of the time spent ruminating. The primary disadvantage of rumination is that it ultimately reinforces the notion of threat in social situations. Recurring negatively-biased old memories are also targeted here, restructuring the negative bias in memory which still affects current social situations. Assignments such as surveys to friends and family are often used here. D. M. Clark's approach emphasizes clients' remembering past events from their own perspective, not from the imagined perspective of others.

In the last 15 years the gap between theory and practice in the treatment of SAD has been narrowed. This is mainly due to the groundbreaking theoretical model which was put forward by Clark D. M. and Wells in 1995. Some of the techniques have been discussed in the previous sections, such as using video feedback to adjust unhelpful imagery and changing memories to update knowledge that maintains social anxiety. Their model incorporates ideas from both clinical observation and theoretical background (see Chapter 3.7). The cognitive treatment (CT) developed by Clark D. M. and Wells based on their model has helped individuals with social anxiety to much greater extent, with more impressive effect sizes on outcome measures, than the more traditional CBT treatments. The evidence is mounting, giving therapists a clearer understanding of what to target in their treatments (Clark D. M.

2003, 2006; McManus et al., 2009; Mortberg, Clark D. M., Sundin, & Wistedt, 2007; Stangier, Heidenreich, Peitz, Lauterback, & Clark, D. M. 2003).

In summary, novel features in Clark D. M. and Wells based treatments include the following. First, a detailed idiosyncratic model of the patient's problem is created to enhance understanding of the problem for the patient. This incorporates the patient's own thoughts, images, attentional strategies, safety behaviours and other symptoms. This is a transparent process which the therapist and the patient discuss in detail. Second, the focus of the treatment approach includes experiential exercises where both safety behaviours and attention are manipulated to demonstrate unfavourable effects of these unhelpful maintenance processes. Third, the treatment involves systematic training in focusing attention externally, both in social and non-social situations. Fourth, the distorted self-imagery is targeted using video feedback. Fifth, systematic surveys are used to further give the patient opportunity to collect data on issues related to social anxiety, providing further corrective feedback. Finally, behavioural experiments are created to test specific negative predictions, and the patient is encouraged to drop the safety behaviour (Clark, D. M. et al., 2006).

4.5 Experimental literature for specific components of CBT

The consensus in the field of clinical psychology to date is that cognitive restructuring and exposure are vital components of any CBT. Importantly, there are theoretically sound ideas behind both these strategies, which have been tested experimentally (Beck & Clark D. A., 2010). However, several other components have been included under the umbrella of CBT

that are no longer considered essential to effective treatments. Examples are relaxation strategies and social skills training.

Relaxation exercises, such as Jacobson's (1938) progressive muscle relaxation, have limited effectiveness in the treatment of social anxiety symptoms (Al-Kubaisy et al., 1992; Alström et al., 1984). Furthermore, Clark D. M. (2004) referred to how Teasdale (1977) revealed with his experimental studies on systematic desensitization that the relaxation training was unnecessary. This is an example where theory and experimental studies provide a guide to more targeted treatment, which in this case have resulted in more effective treatments with superior effect sizes. For example, Clark D. M. and Wells did not include any social skills training in their treatment protocol based on their empirical background research.

The use of social skills training to treat social phobia is controversial. In particular, it is controversial whether people with SAD have a lack of social skills. Moreover, there is no empirical evidence that this component is essential in the treatment of SAD using CBT (see Magee et al., 2009). Furthermore, considering the role of safety behaviours (see Chapter 3.5.1) in social anxiety, in theory these strategies may serve such a purpose. In fact, social skills training manuals could be a recipe for a variety of safety behaviours that can serve to maintain anxiety. This hypothesis needs to be tested experimentally.

Other techniques which some authors consider to fall within the category of CBT are mindfulness-based treatments, and acceptance- and commitment-based techniques. A general

consensus (Jørstad-Stein & Heimberg, 2009; Lampe, 2009; Magee et al., 2009) is that these techniques do not have enough experimental data to support their individual elements over the evidence-based treatment of CBT. The problem with testing their efficacy is that several components of these treatments include exposure and other evidence-based CBT techniques, making it difficult to determine their contribution. However, according to Clark D. M. (2004), we need to continue to test all these different components in order to be able to identify the correct targets. In other words, the smaller the area we choose, the more specific we can be in our targets. In turn, this will give us better insight, and a higher chance of tackling the causal and maintaining factors of social anxiety. A smaller and more specific area within the social anxiety treatment literature is the social anxiety that has been observed in those who stutter.

4.6 The treatment of social anxiety in stuttering

In his groundbreaking work in clinical psychology, Wolpe (1969) covered aspects of the psychological treatment of stuttering. He proposed that stuttering is a consequence of neurotic anxiety, and therefore suggested exploring the stimulus-response to understand the correlations that are causing problems for the patients. In the second edition of Wolpe's book *The practise of behaviour therapy* (1973, pp. 232-233) he stated:

> The dependence of most stuttering on social anxiety is demonstrated by the fact that almost every stutterer speaks fluently when he is alone or in the presence of people whom he is quite comfortable. The greater the

anxiety the social situation evokes, the worse the stutter is likely to be. A behaviour analysis will identify the stimulus elements in the social context that trigger the anxiety; and upon these will depend the therapeutic strategy. Most often, assertive training or some form of desensitization will be indicated or both… . The deconditioning of anxiety is often all that is needed to alleviate stuttering more or less completely, and lastingly. However, in some cases motor operants will keep the stutter going to some extent after the anxiety has been removed and their separate extinction will be needed.

Now, almost 40 years later, the causal roles of social anxiety in stuttering are still not fully understood. Though most contemporary writers in the field would argue that Wolpe (1973) overstated the significance of anxiety in the disorder, Menzies, Onslow, and Packman (1999) concluded that there was mounting evidence to suggest a meditational role for anxiety in stuttering. A recent study indicated that those who stutter have a higher chance of having SAD compared to age- and gender-matched controls (Iverach et al., 2009b).

Only one randomized controlled trial (Menzies et al., 2008) has explored the efficacy of a psychological treatment for SAD in stuttering. The results indicate that CBT reduced anxiety and improved the quality of life for those who stuttered at a 12 month follow assessment, but had no impact on stuttering frequency. However, dropout for psychological measures was significant, with only 14 of the 30 who were in the trial, completing the assessment.

Blumgart, Tran, and Craig (2010) pointed out a flaw in the current DSM-IV diagnostic system. The DSM-IV assumes that social anxiety is always a consequence of stuttering, and therefore proposes that stuttering should be used as exclusion criterion for SAD. However,

Blumgart et al. pointed out that this exclusion, which is based on this unconfirmed assumption, limits access to effective treatment for those who stutter and struggle with social anxiety. This is unfortunate, given that these individuals have a higher risk of having experienced anxiety in a social context, and therefore have a high probability of needing treatment.

In conclusion, it is evident that CBT is an efficacious therapy for SAD. Importantly, only one trial has tested CBT within the population of individuals who stutter (Menzies et al., 2008). In that trial, individuals who stuttered demonstrated less anxiety after receiving CBT and, most importantly, CBT eliminated a DSM diagnosis of social phobia in every case treated. The chapter that follows summarizes the problem in translating these clinical results into accessible treatment services for the 60 million people in the world who suffer from stuttering.

CHAPTER 5 - CLINICAL TRANSLATION: FROM CBT TRIAL TO ACCESSIBLE TREATMENT SERVICES

This chapter provides an overview of the problem of clinical translation from an effective CBT trial for social anxiety for adults who stutter to accessible treatment services in the community. First, the chapter summarizes how the nature of social anxiety limits access to treatment. Furthermore, it summarizes the lack of evidence-based treatment options for all individuals with social anxiety. Next it describes how this treatment delivery is particularly needed for adults who stutter and suffer from social phobia, due to the high prevalence of social phobia in this group. Furthermore, it highlights how mental health problems can interfere with successful speech rehabilitation. The last section shows how this thesis aims to solve the problems of clinical translation for the 60 million people in the world who stutter.

5.1 The nature of social phobia limits access to treatment

The vast majority of people who struggle from social anxiety never seek any treatment (Beck & Clark, D. A., 2010). It is widely established that a social phobia diagnosis is frequently missed in primary care worldwide (Beck & Clark, D. A., 2010; Lampe, 2009). The shame and embarrassment that lie at the heart of social phobia are highly likely to be contributors to this phenomenon. Indeed, a qualitative study by Davidson (2007) highlighted that embarrassment is the primary reason why socially anxious individuals do not report their symptoms to their GP. In a study of 9,282 individuals, Ruscio et al. (2008) found that those who had the most severe social phobia were the least likely to receive treatment.

Astonishingly, once the diagnosis has been made, it can take up to 17 years for treatment to be sought (Beck & Clark, D. A., 2010; Lampe, 2009).

Given the above problems, there is a strong need to find and facilitate ways to make it easier for socially phobic people to seek and receive professional help. One option is to allow people to receive treatment via the internet. It is much less confronting for people to log on to a website than to attend a specialist clinic in person. This can potentially result in the famous "foot-in-the-door" phenomenon. This technique was first published in 1966 by Fredman and Fraser at Stanford University. These authors sought to answer the question, "How can a person be induced to do something he would rather not do?" Their approach involves first asking for something small, before building to a more substantial request. They found that people were more likely to comply with the larger request after they had already agreed to the smaller one. In the case of online therapy, the initial stages involve no human contact, which should appeal to people with social phobia. Agreeing to participate in online treatment may be seen as the "small request". Once people have already been involved with the treatment for some length of time they may be more likely to comply with more difficult tasks. For example, a difficult task is participating in behavioural experiments that involve confronting their fears in social situations.

Despite the major contributions of evidence-based methods in the treatment of social anxiety from the field of clinical psychology in the last 40 years (Rachman, 2009; Chapter 4), it is evident that a minority of sufferers receive effective treatment. A recent report (Shafran et al., 2009) by some the leading researchers in clinical psychology today highlights this problem.

In that report the authors summarize the key cognitive distortions held by clinical psychology clinicians that prevent patients from receiving top-of-the-line treatments for their psychological problems. One of the points they make is that patients fail to receive this care due to the lack of specialist training for many clinicians. Therefore, there is tremendous value in capturing specialist knowledge from expert clinicians, and then using technology to make it widely available. This can be accomplished by using an automated system that runs on the World Wide Web. The need for this is particularly pressing for social anxiety in stuttering, due to the small number of clinical psychologists working in the area.

5.2 The problem of clinical translation of the results from Menzies et al. (2008) to the stuttering population at large

With exclusion criteria suspended, approximately 44% of individuals who stutter meet a DSM-IV diagnosis of social phobia (Stein, Baird, & Walker, 1996). Of those who seek speech restructuring treatments, the proportion who also have a social phobia diagnosis can be as high as 60% (Menzies et al., 2008). Furthermore, an alarmingly high incidence of social anxiety has been found in adults who stutter compared to the general population (Iverach et al., 2009a). This is troubling because of the extreme disability that social anxiety poses for individuals, in both their professional and personal lives (Antony et al., 2009). Finally, a recent study has demonstrated that having a mental health diagnosis is highly correlated with an inability to maintain treatment gains from speech rehabilitation programs (Iverach et al., 2009b).

Menzies et al. (2008) demonstrated that CBT is an excellent method for treating mental health problems for adults who stutter. Their RCT demonstrated that social phobia diagnoses were removed for all members of the experimental group, whereas the control group intervention (i.e. those who received speech restructuring alone) did little to eliminate social phobia. Furthermore, everyday life improved significantly for the experimental group who received CBT, in that their Global Assessment of Functioning (GAF) scores improved markedly. However, the clinical results from the Menzies et al. (2008) trial are not easily translated into the community at large. There are several reasons for this.

First, in the Menzies et al. (2008) trial, a highly experienced clinical psychologist who had significant training in the management of stuttering was used. This specialty is rare in the psychology workforce. Therefore, given the high prevalence of social anxiety, there is a lack of resources available to treat the population of those who stutter and also suffer from social anxiety. Furthermore, those who stutter have special needs as compared with other psychological disorders, given that stuttering has complex origins and specific negative cognitions associated with it (St Clair, et al., 2008). The fact that stuttering is not addressed in clinical psychology curricula makes it unlikely that those seeking help for their social anxiety with a clinical psychologist would receive adequate treatment.

Second, individuals in rural areas have limited access to psychological services. The cost and time commitment of travelling put this population at a disadvantage, as there are practical difficulties in attending treatments. Therefore, this group is even more likely to have to live with social anxiety, and maladaptive social isolation is also a greater risk among this group.

Finally, a core problem is posed by the fact that individuals who stutter do not see themselves as having a psychiatric problem. Therefore, this population is rarely seen in psychology clinics. It is possible that the increased stigma associated with psychological treatment compared to speech rehabilitation may be a contributing factor. However, it is clear that the management of stuttering rests within the field of speech pathology, and the delivery of CBT rests within the field of clinical psychology. Therefore, translating the successful clinical results to the stuttering community poses several challenges.

One promising answer to the present problem lies in an online treatment protocol that can deliver high quality specialist knowledge from clinical psychologists that can be used by speech pathologists managing adults with chronic stuttering.

5.3 Fully automated online therapy

The remainder of this thesis presents a case study for a fully automated online "therapist". The computer therapist embodied knowledge from a clinical psychologist with 25 years of expertise in the area of treating anxiety disorders, and 15 years of experience in the area of stuttering. It is argued that the online therapist developed in this thesis offers a solution to the translation problems raised above.

CBTpsych.com is the name of the "therapist" that was researched and developed to solve the translation difficulties. Appendix 2 includes a full copy of the website's content. The computer program was written by the candidate in the scripting language PHP, and using a MySQL database for information storage and retrieval. The system runs on a Linux-based Apache server, although it can be ported to other platforms.

The content of the program is based on the work of Menzies et al. (2008), who outlined a live group based CBT social anxiety treatment package for people who stutter. Their treatment protocol included group treatment, tailored CBT, with hierarchical exposure tasks, behavioural experiments, cognitive restructuring tasks, and relapse prevention

A novel feature in this treatment protocol is the clinical data that is used for corrective feedback, which is written in such way that individualised treatment is conducted. The components of the program are designed to be consistent with the Clark D. M. & Wells (1995) research literature (see Chapters 3 and 4). Therefore, novel features incorporated in CBTpsych.com, that were not part of the Menzies et al. 2008 trial, include: 1) development of a personalised Clark D. M. and Wells model for each patient using the patient's anxiety symptoms, safety behaviours, unhelpful imagery; 2) discussing and eliminating safety behaviours are pivotal for the treatment, and are an important part of behavioural experiments; 3) attention deployment is targeted in order to help the patient shift their attention from themselves in social situations and have better control over shifting away from negative post event rumination; 4) problematic anticipatory and post event processing is targeted; and 5) rescripting of unhelpful imagery maintaining social anxiety.

However, several features from the Clark D. M. and Wells treatment needed to be adjusted, given that this population was adults who stutter. In particular, the video feedback section was not used since there is no evidence that those who stutter have a highly negatively *distorted* image of themselves in social situations. Furthermore, having the patients conduct surveys about other people's perception of those who stutter was also eliminated. This is because it might fail to be effective as positive feedback, as there is some evidence of stereotyping and prejudice against those who stutter (see Chapter 2 and MacKinnon et al., 2007).

CBTpsych.com contains thousands of examples to be used as clinical data, which are used to generate automatic feedback for patients. These examples were written on the basis of the principles of CBT, and reviewed by an expert in that field who also has extensive experience in stuttering management.

5.4 Artificial intelligence

Modern advances in artificial intelligence (AI) have produced machines that excel in highly specialized areas, such as playing chess, recognizing and matching images of fingerprints, or reading printed characters. However, certain areas of human intellect still pose significant challenges for AI researchers (Crevier, 1993). For example, general object recognition is easily accomplished by young children, but has been surprisingly difficult to automate (Ullman, 1996). Consider, for instance, a system that is designed to recognize chairs. Such a

system would require an unambiguous definition (or model) of what a chair is. At first, formulating this definition might seem like an easy task; perhaps "something that has four legs and people can sit on". However, a little thought demonstrates that this definition is inadequate. Tables can have four legs and can be sat on, but are certainly not chairs. Furthermore, many chairs do not have four legs. Also, the definition assumes implicit knowledge that is not immediately obvious. For example, the system would need to know what it means to "sit", resulting in a cascade of definitions. Formalizing these fuzzy concepts (see further Luger & Stubblefield, 2004) in the inflexible language of computers has proved to be much more challenging than anyone expected (Crevier, 1993). Taking automated systems to the next level, including concepts such as emotion, creativity, motivation, consciousness and self-awareness, may be beyond the reach of today's technology. However, some prominent researchers feel that given the exponential advances in technology that we are currently experiencing, systems exhibiting these behaviours may be achievable within the next few generations (Kurzweil, 2005).

Measuring the intelligence of a machine is a difficult task in itself. As mentioned above, machines can already outperform people in some areas (e.g. calculation), but are drastically lacking in others (e.g. composing art). Therefore, current machines can be considered intelligent in some respects but not others. The brilliant mathematician Alan Turing proposed a solution to measuring intelligence in the 1950s (Turing, 1950). The "Turing Test" involves a person communicating with another entity that is either a person or a machine. The challenge for the person is to try to determine if he or she is talking to a real person by engaging in conversation. If the person cannot tell the difference between a real person and a

machine, the machine is said to have passed the Turing Test. In that case, as Turing argued, we may as well attribute intelligence to the machine, since its behaviour is indistinguishable from human behaviour.

Currently, no machine has succeeded in passing the Turing Test in a general setting. However, in certain restricted situations, people have been fooled into thinking they are communicating with a real person, when in fact they were communicating with a machine. For example, in 1966 a famous computer program known as "Eliza" was tested, and some participants were convinced they were conversing with a real therapist (see Chapter 7.1).

The goal of this thesis is not to mimic the complex interactions between a patient and a therapist using a fully autonomous and intelligent system. Rather, it proposes a new paradigm in mental health treatment delivery. In particular, the goal is to embody specialist knowledge from cutting edge psychological research into a computer program, and deliver this treatment using an online system. Furthermore, the proposed system is not static. In other words, it does not simply provide online reading material for patients. CBTpsych.com can adapt to the specific and subtle requirements of the individual user, and adapt the treatment accordingly. It is this aspect that distinguishes CBTpsych.com from existing online treatment programs, which are reviewed in the next chapter.

CHAPTER 6 – PROBLEMS WITH EXISTING INTERNET-BASED TREATMENTS FOR MENTAL HEALTH

Note. The material in this chapter has been published as Helgadottir, F. D., Menzies, R., Onslow, M. Packman, A. & O'Brian, S. (2009a). Online CBT I: Bridging the gap between Eliza and modern online CBT treatment packages. *Behaviour Change, 26* (4), 245-253.

6.1 Introduction

In 1991, Isaac Marks argued that "refining care delivery to the point where self-care becomes possible is often the product of the most sophisticated stage of a science. Behavioural psychotherapy is entering that mature stage" (p. 41). Marks was referring to the increased knowledge of the basic principles in behavioural psychotherapy which had led to less therapist time being needed to treat anxiety disorders. At the same time, others were also searching for treatment modalities that could essentially be delivered in a "self-care" mode. Computerised treatment lay at the heart of these attempts.

The earliest recorded attempt to create a computerized psychologist was in 1966 by Joseph Weizenbaum. His program, dubbed "Eliza", was designed to simulate a Rogerian psychologist, and used natural language processing (NLP) to interact with people by asking open-ended questions in an empathic manner. This was the first use of automation to create the illusion of human-human clinical interaction through a computer-human interface (Weizenbaum, 1966). However, despite initial optimism, little progress has been

made since then in the development of a fully automated technique for treating mental health disorders. Most attempts at developing computerized cognitive behaviour therapy treatment packages have included a therapist contact component.

Three recent meta-analyses have investigated the efficacy of current internet CBT treatments. One review revealed impressive effect sizes for health related issues such as headaches and pain problems (Cujipers, van Straten, & Andersson, 2008). A second, which explored CBT for anxiety and depression, showed promising results for anxiety but not depression (Spek et al., 2007). The third focused on the various electronic devices (e.g. computers, PDAs, DVDs) used to treat anxiety disorders. The authors concluded that in some cases therapy involving the use of electronic devices might match the outcomes of face-to-face therapy (Cuijpers et al., 2009). However, a consistent finding across all reviews was that the amount of therapist time spent with each client remained the most important prognostic indicator for positive outcomes.

The importance of therapist time for internet treatments can be seen in recent social phobia treatments. Several independent research teams have demonstrated the efficacy of online social anxiety treatments in randomized trials (Andersson et al., 2006; Berger, Hohl, & Caspar, 2009; Carlbring et al, 2007; Titov, Andrews, Schwencke, Drobny, & Einstein, 2008a; Titov, Andrews, & Schwencke, 2008b). Further, the treatment benefits observed in at least one of these trials have been maintained for up to 30 months post-treatment (Carlbring, Nordgren, Furmark, & Andersson, 2009). However, all of these trials included

at least 2-3 hours of therapist contact per person, which is inconsistent with the goals of "self care" and the fully automated "Elizian" therapist.

This chapter addresses the shortcomings of existing computerised treatment systems, including those with no therapist contact, and provides suggestions about how to proceed in creating fully automated treatment systems that are tailored to individual patients.

6.2 The lack of individualized formulations

Spek et al. (2007) identified seven studies with no therapist involvement. Two of these were prevention studies in non-clinical samples (Kenardy, McCafferty & Rosa, 2003; Patten, 2003), and the findings therefore cannot be generalized to clinical populations. Four involved some therapist contact via in-person instructional sessions (Klein & Richards, 2001), non-automated email reminders (Hirai & Clum, 2005), phone contact (Christensen, Griffiths, & Jorm, 2004) or both emails and phone calls (Clarke et al., 2005). The final study (Clarke et al., 2002) was the only one with no therapist contact in a clinical population, and showed poor results with low retention rates.

Programs with no therapist contact are referred to as standalone programs. One of the best-known standalone programs is MoodGYM (http://moodgym.anu.edu.au). However, this program does not customize its formulation for individual users; each person using the

program appears to receive essentially the same intervention. This is theoretically problematic, and is inconsistent with the emphasis on individual formulations that is the crux of traditional CBT programs worldwide. A "one size fits all" approach to computerized treatment is likely to simplify an individual's condition, and to lead to reduced engagement with the program by the client.

An alternative approach would be to use clinical file audit data to generate large lists of commonly reported unhelpful thoughts, beliefs, and behaviours. These would enable a standalone computer program to tailor responses to a patient's individual problems. In our view, computerized treatment programs should open with extensive assessment of the individual's symptoms, just as in-person therapy does, in order to produce an individualized formulation. For example, the recently developed CBTpsych.com, which specifically targets anxiety in stuttering, is based around the Unhelpful Thoughts and Beliefs about Stuttering (UTBAS) questionnaire (St Clare et al., 2008). The UTBAS is a comprehensive measure of cognitions about anxiety in stuttering based on a 10-year file audit from several major anxiety clinics in Sydney, Australia. The clinical tool contains 66 different unhelpful thoughts reported on thought monitoring sheets by individuals who stutter, during CBT treatment. CBTpsych.com opens with the completion of this instrument, as well as measures of avoidance, safety behaviours, mental imagery and physiological responses, enabling the program to build an individual formulation consistent with the established cognitive model of social phobia of Clark and Wells (1995). This individualized formulation then guides the individual's treatment program. For example, specific behavioural experiments are developed for each individual in order to test the particular unhelpful beliefs of the individual in settings

that would typically be avoided. In our view, individualized formulations that guide the treatment process are a critical component of standalone computer treatment models of the future.

6.3 The lack of automated corrective feedback

Many standalone programs seem to assume a higher degree of patient understanding of CBT treatment than appears reasonable. For example, E-COUCH (http://ecouch.anu.edu.au) assumes that clients can create their own behavioural experiments for exposure purposes. Similarly, MoodGYM expects client to distinguish between thoughts, emotions and behaviours. It is likely that without corrective feedback for client attempting to complete these tasks, most will be unable to correctly and effectively complete these programs. An inherent problem with many of the current standalone computerized CBT programs is that corrective feedback is generally not provided for client responses. Some standalone programs allow users to print out summaries of their answers throughout the program, and some of these packages refer to these summaries as "individualised feedback". However, to our knowledge, none of the currently available standalone programs offer corrective feedback from the "computer psychologist" that can be compared with the individual's responses. This is a serious limitation of current standalone online treatment protocols, which may result in clients consistently answering cognitive restructuring questions incorrectly without receiving feedback on these errors.

Providing sample answers for all written work in standalone CBT programs is an effective way to address the issue of corrective feedback. It ensures that after completing any exercise individuals can review their responses against the optimal responses provided by the "computer psychologist". An example of this approach can be seen in CBTpsych.com. In this program, 528 sample answers are provided for the cognitive restructuring phase of this social anxiety treatment program. Individual complete restructuring exercises on just the UTBAS items that they previously noted as frequently experienced. After completing eight probe questions on the unhelpful thought, individuals are asked to compare their answers to those of the "computer psychologist" before attempting the next restructuring exercise. In this way, the quality of clients' responses is shaped over successive trials to approximate the computerized psychologist. Table 6.1 contains an example of the sample answers provided for one of the 66 negative thoughts on the UTBAS in CBTpsych.com.

Table 6.1. Sample answers provided by the computer psychologist to Unhelpful Thought No. 14. *Other people will think I am stupid if I stutter*

1. *What evidence do you have for the thought?*
   I have no evidence for this thought. I often *feel* like the thought is true, but I simply don't have any evidence that it's true. This is an example of 'emotional reasoning'. Nobody has ever told me that I am stupid because I stutter. Nobody has ever told me that others are thinking this. And anyway, how could I have evidence for this thought – it's predicting the thinking of people in situations that haven't even happened yet. It's a good example of 'mind-reading'.
2. *What evidence do you have against the thought?*
   To begin with, lots of people who stutter have achieved great things. For example, consider all these people: Aesop (writer of famous fables), Aristotle (famous thinker), Lewis Carroll (writer of Alice in Wonderland), Winston Churchill (English PM during WWII), Claudius (Roman Emperor), Nat King Cole (singer), Richard Condon (Novelist – Prizzies Honour Manchurian Candidate), Charles Darwin (Theory of Evolution), King George VI (King of England), Henry James (Novelist), Thomas Jefferson (US President), Lenin (Russian Communist Leader), Louis II (King of France), Isaac Newtown (Scientist-Law of Gravity), Alan Turing (founder of computer science), Virgil (Roman poet), George Washington (US president), Rowan Atkinson ('Mr Bean'), Jake Eberts (Film Producer-Gandhi, Dances with Wolves), Noel Gallagher (Guitarist-Oasis), Ben Johnson (Athlete), Harvey Keitel (Actor), and Carly Simon (singer).

Clearly, people didn't think they were stupid. And I know that people close to me don't think I'm stupid. I have had great performance reviews at work/school.

3. *What would you tell a friend (to help them) if they had the thought?*
   a. I would tell him that it simply isn't true.
   b. I would point out that if someone *did* think you're stupid because you stutter, s/he is the one who is stupid.
   c. Why do you care what people think in the first place? What's the point? Why worry about what other people are thinking and doing – just get on with your own life.
4. *Think of your calmest, most rational and supportive friend or family member. How would he/she react to the causal thought? What would he/she say?*
   Who cares what they think. They don't have any power over how bright you are. If you stutter, you stutter – nothing worse than that. You really don't need to care if someone thinks you're stupid, because deep down you know you're not.
5. *Are you worrying about an outcome that you can't control? Is there any point to this type of worry?*
   I can't change what people think of me. Worrying about what people think of me is not going to change their opinions. So no, there isn't any point to this type of worry. People will think whatever they want, just as I do about others.
6. *What does the thought do for you? How does it make you feel? Is it helpful in any way, or is it just distressing?*
   Well, it gives me a stomach ache and I feel like I have to throw up, it makes me anxious whenever I think it. It keeps me out of social situations – it makes me avoid new people and new places. It robs me of opportunities in life. I cannot see any helpful thing about this thought. It is wholly destructive, and has the potential to significantly damage my life.
7. *What good things would you gain if you gave up the thought?*
   How would your life be different if you didn't believe the thought?
   Well, I wouldn't feel sick in my stomach anymore. My life would be more relaxed, since I wouldn't be worrying all the time about my interaction with other people! What a relief that would be. And the world would open up to me. I would put myself forward at work, and when I meet people. I wouldn't be afraid to ask people out. I'd start to get the things I want from life.
8. *If the causal thought was true, what is the worst outcome? Is it as bad as you think?*
   The worst scenario is that on rare occasions somebody would think I was stupid because I stutter. But I guess that isn't all that traumatic when I really think about it. My friends and family know very well that I am not stupid. I know that I am not stupid. So it's probably not as bad as I thought, and this is the worst case scenario!

The goal of corrective feedback, throughout every aspect of a computerised treatment program, is to make the user feel as if there is a sentient agent behind the scenes, when in reality it is nothing more than automated algorithms. This feature helps to imitate the therapeutic relationship, and ensures that patients use online treatment programs to more effectively correct the way they think.

6.4 The lack of automated features for adherence

Another problem with standalone treatments is that they have typically been associated with very high dropout rates. In some studies, as few as 1% to 7% of those starting treatment have completed all modules of the program (Farvolden, Denisoff, Selby, Bagby, & Rudy, 2005; Christensen, Griffiths, Groves, & Korten, 2006). There are many possible reasons for this. Earlier in this chapter, we proposed that the lack of individualized formulations of most standalone programs might contribute to reduced client engagement. This in turn may result in high levels of dropout. Moreover, many individuals may simply forget to regularly log on and, without any behavioural monitoring schemes in place, become inadvertent dropouts. This is a significant obstacle to the adoption of online treatment programs, yet there are few solutions proposed in the literature.

One potential solution is to have an automated system in place that tracks the last time a participant logged on, and then periodically sends email reminders. For example, a reminder email might be sent after 3 days of not logging on, 7 days, 10 days and so forth. Once the participant logs on again, the system would be reset to 0. This delivery of regular reminders of the need to complete the treatment components is likely to improve treatment adherence.

Another solution to this problem could be to create time pressure for access to the computer program. Klein and Richards (2001) reported only one dropout when they gave time limited access to their online panic treatment program. However, their trial was only semi-

standalone, given that the senior author had to show the participants how to access and navigate the program and also to check whether clients were accessing the program during the active treatment phase. The low dropout rate could also have been an artefact of the relatively brief nature of the intervention. Despite these caveats, we believe that limited access time to standalone program should be explored as a means of enhancing adherence to the program.

Further, the process of time pressure can be easily automated. For example, the computer can create a completion date for individuals when they begin the treatment program, and automated emails can regularly remind them of this date, and how many days they have left to complete the program. The obvious benefit of having this automated process is that the computer takes over the monitoring role. Despite this simple way of improving adherence, no one to date has published a standalone trial using this feature.

6.5 The lack of human contact e.g. vision or voice

The importance of the therapeutic relationship in CBT has been demonstrated in several studies (Elvins & Green, 2008; Martin, Garske, & Davis, 2000). Therefore, it is not surprising that treatment gains from online therapies are positively correlated to therapist contact. Current online therapies do not address this challenge. In other words, no attempt has been made to mimic the therapeutic relationship using the computer. One approach to

this is the use of multimedia. For example, sound clips can be used to implement voiceovers.

In theory, voiceovers could make individuals feel as though they have a therapist travelling with them throughout the online treatment. Furthermore, voiceovers provide an opportunity for world-leading specialists to give treatments to a wider audience than would otherwise be possible. The authors are not aware of any existing systems that have therapist voiceovers used to deliver online cognitive treatments in this way. However, the idea behind pre-recorded voiceovers is not new in clinical psychology. Marks et al. (1998) demonstrated this approach when they published their innovative telephone-based program, BTsteps, which incorporated self-assessment and self-administered treatment of OCD via interactive voice response. They were the first to use sound clips to deliver interactive feedback in an automated exposure treatment. However, this approach has not been used to simulate an interactive client and therapist relationship. Personalized voiceovers could be extremely useful when delivering behavioural experiments in cognitive therapy, since the voiceover can be made dependent on the feedback the client has given to the computer from the exposure task.

Another feature of human contact which could be simulated is vision. Most current computer programs use cartoons for the characters in their programs. For example, E-COUCH uses cartoon video clips to explain generalized CBT concepts. This may have the effect of distancing the patient even further from the traditional treatment experience. Therefore, using real images of people might give automated treatment programs a human

contact “feel”. The more life-like we can make the interaction, the closer we can get towards mimicking a real CBT therapy experience. Andersson, Carlbring, Berger, Almlöv, & Cuijpers (2009) argued that it is even important to show photos and names of the support staff behind their program. This idea could be taken one step further, by having all examples in the program illustrated with photographs of real scenes.

Another important feature could be to have the computer intervention programmed in such a way that is not too predictable. One way of creating such an environment would be to have error messages that vary. For example, some error messages might include the name of the patient, such as “OK Joe. It is very important that you write something in the evidence column 1. If you have no evidence, please write ‘No evidence’. Remember, only write evidence that would stand as evidence in the court of law!” Another error message might comment on the length of the content entered into the program, such as, “It looks like you have written very short answers to these questions – really have a go and try your best to write more detailed answers”.

6.6 The lack of an adequate CBT dose for individuals’ problems

As mentioned earlier, current standalone programs tend not to target individualized problems for clients. Instead, clients receive generalized CBT psychoeducation and treatment. Further, they do not get help with cognitive restructuring of their particular, idiosyncratic pattern of negative thoughts and beliefs. The impact of this is that the clients

receive a relatively low dose of CBT targeted to their actual problem set. This could at least partly explain why CBT intervention and CBT psychoeducation did not differ significantly at a 12-month follow up in the study of Mackinnon et al. (2008).

An important feature for delivering an adequate CBT dose in computerized treatments is an accurate formulation. We strongly argue that formulations that are based on individualized avoidances, safety behaviours, mental imagery and physiological anxiety symptoms have a much higher chance of targeting the crucial problems individuals are struggling with. In addition, once the specific negative thoughts and behaviours are identified, it is important that standalone programs ensure that individuals receive a large number of opportunities to engage in cognitive and behavioural tasks relevant to their problems. As a general rule, it seems that most current standalone programs do not include sufficient repetition of CBT exercises to facilitate lasting change. CBT dose has been shown to be an important predictor of treatment outcome (Craske et al., 2006).

6.7 Conclusions

Existing standalone computer programs lack individualized feedback and expect too much CBT knowledge from patients. To progress in the development of a "computer psychologist", we need to focus efforts on creating illusionary therapist assisted systems. This will not happen unless online programs target specialized areas so that we can use computer algorithms to generate individualized profiles and use techniques such as voiceovers and

individualized automated emails to enhance the human-computer clinical experience. We disagree with Andersson's (2009) claim that the computer cannot totally replace human contact. Rather, we argue that we should aim to continually improve our imitation of human contact using emerging technologies. We disagree with Mohr's (2009) argument that we have a limited ability to individualize and tailor standalone internet treatments. Rather, we argue that a standalone program, given a thorough online assessment phase to guide the automation processes, can effectively create individual treatment formulations. Major work is needed in this area to meet the initial optimism that arose following the appearance of Eliza in 1966. Future developments in artificial intelligence will no doubt contribute to the success of this endeavour.

CHAPTER 7 – CBTPSYCH.COM AND A PHASE I STUDY

Note. The material in this chapter has been published as Helgadottir, F. D., Menzies, R., Onslow, M. Packman, A. & O'Brian, S. (2009b). Online CBT II: A Phase I trial of a standalone, online CBT treatment program for social anxiety in stuttering. *Behaviour Change, 26* (4), 254-270.

7.1. Introduction

Despite the high rate of mental health problems among adults who stutter, few studies to date have explored psychological treatment options for this group. Cognitive behaviour therapy is the only psychological treatment that has been tested in a randomized controlled trial for this population. A 12-month blinded follow up of a CBT treatment resulted in the complete elimination of social phobia (SP) diagnoses in the experimental group compared to 50% rate of SP in the control group (Menzies at al., 2008). Furthermore, participants who received CBT experienced a greater improvement in engagement in everyday activities and reduced avoidance, compared to those in the control group. A more detailed review can be found in Chapter 4.6.

Chapter 6 reviewed the current available internet-based treatment programs. It is identified that most online CBT packages lack several features that take full advantage of the potential cost effectiveness of using the internet. In contrast, the program CBTpsych.com addresses

key limitations of current standalone treatment packages, such as: (1) the lack of individualized formulations, (2) the lack of automated corrective feedback, (3) the lack of automated features for adherence, (4) the lack of human contact e.g. vision or voice, and (5) the lack of an adequate CBT dose.

CBTpsych.com is a standalone online program developed to target these limitations in treating social anxiety associated with stuttering. CBTpsych.com attempts to imitate real therapist contact using computer algorithms. The present study aims to assess the viability, safety, effectiveness, and usability of his standalone program in the stuttering population. This chapter begins with an overview of CBTpsych.com, and contains the results of a Phase I study.

7.2 The structure of CBTpsych.com

All components of CBTpsych.com are presented in the appendices of this thesis. What follows is a short description of its structure. To imitate a real therapist experience, CBTpsych.com uses two clinical psychologists (one female and one male) who "talk" to the patient using pre-recorded sound clips throughout the program. Also, CBTpsych.com incorporates individualized automated emails to target adherence. Patients receive emails that congratulate them for completing each section (see Figure 7.1).

Subject: Congratulations for finishing Part 3 of CBTpsych.com

f.helgadottir@usyd.edu.au to ben@gmail.com 04/11/2008 Reply – Inbox

Congratulations Ben for finishing part 3 of CBTpsych.com

You have now learned how social anxiety manifests itself in people, and the different roles causal thoughts and safety behaviours play in maintaining the problem. You are now almost half-way through the program and in the next section it is time for you to go out and experience things in the real world. It is extremely important that you actually DO the exercises we ask you to do, if you are to benefit from the program. We wish you best of luck with it all and keep up the good work!

To get back into the program use this link here: http://www5.fhs.usyd.edu.au/fjola and use your username and password.

You have now finished 0 of the 20 weeks you have to do the program. We want to remind you again of your due date Tuesday, March 24th, 2009 and unfortunately we do not give any extensions. Keep up the good work! Only 140 days left.

Cheers

Fjola & Ross

THIS IS AN AUTOMATED EMAIL, SO PLEASE DO NOT RESPOND TO IT. IF YOU DO, PLEASE DO NOT EXPECT A REPLY.

Figure 7.1. A sample email sent to a participant after completing one section.

Patients receive reminders if they have not logged on for 3, 7, 10, 14, 21 or 28 days. This system is reset to 0 every time patients log on. In these emails, patients are reminded that they have a limited time to complete the program. This feature of applying a time limit of 5 months was designed to boost retention rates (see Figure 7.2).

Subject: 3 day reminder from the CBTpsych.com

f.helgadottir@usyd.edu.au to inga@gmail.com 12/02/2008 Reply – Inbox

Hello Inga

This is a reminder that it has been 3 days since you last logged on. Remember you only have five months to complete this program and we expect you to log on around twice a week.

Your latest finish date is 01-05-2009 at 10:56. There are still 78 days to go, so keep up the good work!

To logon again, press this link: http://www5.fhs.usyd.edu.au/fjola

Your username is: Inga

Cheers

Fjola & Ross

THIS IS AN AUTOMATED EMAIL, SO PLEASE DO NOT RESPOND TO IT.

Figure 7.2. A sample email sent to a participants who had not logged on for 3 days.

CBTpsych.com is divided into seven sections. Early in the program, an individualized profile for each patient is built from a comprehensive online battery of measures designed to assess negative thoughts, behaviours, and emotional responses. These psychometric tests are readministered at the end of the seventh section. Patients must complete each section in order to be able to enter the subsequent section. Details of each section are provided here.

Section 1: In Section 1 the cognitive model of emotion is introduced, and common cognitive errors are described. Furthermore, in this section, a virtual therapeutic relationship is established when the virtual clinical psychologists introduce themselves via a photograph and a pre-recorded sound clip. Finally, this section is designed to familiarize patients with the technological aspects of the program, such as learning to use the feedback, and voiceovers.

Section 2: File audit data from 10 years of work by senior clinical psychologists in major anxiety clinics in Sydney was used to compile a list of 66 unhelpful thoughts experienced by adults who stutter in social situations. The resulting scale, known as UTBAS (Unhelpful Thoughts and Beliefs About Stuttering) was used to create a tailored profile of cognitive errors for each patient (see further St Clare et al., 2008). By using eight standard probe questions, 528 different cognitive restructuring sample answers were written to provide patients with individualized corrective feedback for their unhelpful thoughts. In this section, the patient must write at least 40 different cognitive challenges to ensure an adequate dose of restructuring prior to moving on to the next sections. Corrective feedback, in the form of

sample answers, is provided for each patient response. In this way, the quality of patient responses is shaped across trials.

Section 3: In this section an extensive psychoeducation component on the Clark D. M. and Wells model (1995) of SP is presented. The instructions show patients how to build their personal SP formulation. To prevent errors in constructing the individualized formulation, pre-written symptoms are selected from a list. These include avoided situations, cognitions driving anxiety and avoidance, safety behaviours, mental images and physical anxiety symptoms. This model is then used later in the program to perform behavioural experiments and to target unhelpful imagery.

Section 4: Section 4 uses the individualized formulation created in Section 3. In this component patients select an avoided situation, which they can choose from their own avoided situations list. CBTpsych.com then creates a behavioural experiment for that situation, targeting one or more different cognitions responsible for driving the avoidance and anxiety. The number of experiments to be completed in this section is expected to be around 10 for each patient. In addition to completing worksheets on the results of the experiment, patients carry out additional cognitive restructuring exercises. Section 4 has the potential to create 3620 different behavioural experiments for the patients, based on their individualized profile of unhelpful cognitions and avoided behaviours. The program determines whether each experiment should be repeated prior to recommending a novel experiment. CBTpsych.com bases this decision on whether patients indicate that they would still avoid the previously feared situation.

Section 5: Since self-focused attention and the adoption of an observer perspective are significant problems in social anxiety, Section 5 addresses these maintaining factors. First, skills-based attention training (Wells, 2000) is taught in order to increase the patients' control of attention in social situations. Second, rescripting methods are used to help "update" faulty and unhelpful imagery (Holmes, Arntz, & Smucker, 2007). The voiceovers in these sections are particularly important, as patients hear a voice that rescripts their particular image selected on the basis of their tailored formulation as constructed in Section 3.

Section 6: Further work on challenging fear of negative evaluation is included in Section 6. In this section, patients write an essay with the title "Why it doesn't matter what other people think of me". In line with the rest of the program, a pre-written sample essay is provided. Furthermore, targeting of maladaptive "should" statements is covered. Patients select 3 out of 17 "shoulds" that they commonly experience, e.g. "I shouldn't stutter"; "Other people should be polite"; and "I should be married or in a committed relationship". Next, patients receive individualized feedback in a cost-benefit analysis exercise. This component of CBTpsych.com includes 34 different sample answers to help patients target the "tyranny of the shoulds".

Section 7: This section deals with relapse prevention and reviews all the former components of the program. Furthermore, as depression is a frequent comorbid condition in SP, and commonly reported among adults who stutter, psychoeducation is focused on preventive

behaviours that patients can engage in to maintain treatment gains and avoid negative moods.

7.3 Method

7.3.1 Design

This study used psychometric tests to measure changes before and after the CBTpsych.com intervention. Furthermore, the quality of the interaction with the computer psychologist was analysed.

7.3.2 Participants

Two participants seeking treatment for stuttering at the Australian Stuttering Research Centre (ASRC) took part in this trial. Both received a DSM-IV diagnosis of SP following initial screening with the Composite International Diagnostic Inventory – Auto (CIDI-Auto-2.1; World Health Organization, 1997). *Participant 1* was a 40 year old married male with a high school education. He reported stuttering onset at age 3. He also reported a positive family history of stuttering: namely, in his maternal aunt. *Participant 2* was a 57 year old married male with a bachelor's degree. He reported that his stuttering had emerged at age 10. He reported several family members suffering from stuttering: paternal uncle, brother, and two of his sons.

Eligibility criteria for participant inclusion in the present study were: (1) aged between 18 and 70 years, (2) not having seen a clinical psychologist for CBT treatment within the last 6 months, (3) access to regular internet/email, (4) functional written and spoken English, (5) no endorsement of the suicide item on the Beck's Depression Inventory (BDI-II). The study was approved by the Human Research Ethics committee at the University of Sydney and written informed consent was obtained from both participants.

7.3.3. Outcome measures

Psychometric tests were administered before and after the intervention. Three different modes of data collection were used for psychometric testing: an automated diagnostic interview, a pencil and paper booklet, and an online questionnaire. No therapist contact occurred during psychometric testing. For example, the DSM-IV (APA, 1994) and ICD-10 (WHO, 1993) diagnoses were obtained using the self-administered, computerized version of the Composite International Diagnostic Interview (CIDI-Auto-2.1; WHO, 1997). However, a research assistant with no psychology qualification contacted the participants for the collection of data. Ten tests were used to evaluate the participants, as described in detail in the following subsections.

7.3.3.1 Computerized Version of the Composite International Diagnostic Interview (CIDI-Auto-2.1) (WHO, 1997). The CIDI-Auto-2.1 is a standardized interview which is self-administered on a laptop computer. It is designed to comprehensively assess and diagnose

mental health problems according to the DSM-IV and ICD-10. The interview has established adequate reliability and validity (WHO, 1997). Furthermore, the CIDI-Auto-2.1 provides comparable prevalence rates of psychiatric conditions to those obtained through clinical interview (Lampe, Slade, Issakidis, & Andrews, 2003).

7.3.3.2 Fear of Negative Evaluation Scale (FNE) (Watson & Friend, 1969). The FNE contains 30 "true" and "false" statements designed to measure fear of negative evaluation by others. For 17 of the statements, a response of "true" adds a score of 1 and for the other 13 statements a response of "false" adds a score of 1. This leads to a score in the range of 0 to 30 which reflects the social anxiety of the participant. This measure has been used extensively in social anxiety research (Stopa & Clark D. M., 2001) and has established excellent psychometric properties (Durm & Glaze, 2001; Garcia-Lopez, Olivares, Hidalgo, Beidel, & Turner, 2001).

7.3.3.3 Unhelpful Thoughts and Beliefs About Stuttering (UTBAS) (St Clare et al., 2008). The UTBAS contains 66 items that assess the frequency of unhelpful thoughts and beliefs about stuttering. The scale is scored on a 5-point Likert scale ranging from 1: "Never have the thought" to 5: "Always have the thought". Items were constructed from a comprehensive file audit of stuttering cases seen in CBT clinics over a 10-year period. The measure demonstrates high reliability and validity within the stuttering population (St Clare et al., 2008).

7.3.3.4 Stuttering Specific Avoidance Scale (SSAS) (Helgadottir, Menzies, O'Brian, Onslow, & Packman, 2007). The SSAS contains 55 items which cover avoided situations common to adults who stutter. The items were generated by surveying senior speech pathologists with a minimum of 10 years experience in the management of stuttering. Participants indicate their avoidance on a 5-point Likert scale ranging from 0: "Never avoid" to 4: "Always avoid". This measure was used for the first time in the present study.

7.3.3.5 The State-Trait Anxiety Inventory (STAI) (Spielberger, 1983). The STAI-T is a self-reported measure that includes 20 items relevant to trait anxiety. The scale is scored from 1: "Almost never" to 4: "Almost always". The measure demonstrates adequate reliability and validity (Spielberger, Reheiser, Owen, & Sydenham, 2004), and is among the most widely used anxiety scales in clinical studies over the past 20 years.

7.3.3.6 Social Phobia Anxiety Inventory (SPAI) (Turner, Beidel, & Dancu, 1996). The SPAI includes 45 items. The inventory is scored from 0: "Never" to 6: "Always". The SPAI is an empirically derived instrument that incorporates responses from the cognitive, somatic, and behavioural dimension of SP. This instrument can distinguish socially phobic patients from other anxiety patients. The inventory has high levels of demonstrated reliability and convergent validity (Turner, Beidel, Dancu, & Stanely, 1989).

7.3.3.7 Beck Depression Inventory-II (BDI-II) (Beck, 1996). The BDI-II includes 21 items that measure a variety of depressive symptoms. The inventory is scored from 0 to 3. For

example, for sadness a score of 0 equates to “I do not feel sad”, and a score of 3 equates to “I am so sad I can’t stand it”. The inventory has adequate reliability and validity (Dozois, Dobsin, & Ahnberg, 1998; Osman et al., 1997) and has become a standard measure for the assessment of depression in clinical populations.

7.3.3.8 The Social Evaluation Scale (EMAS-T-SE) (Endler, Edwards, & Vitelli, 1991a). The Social Evaluation (EMAS-T-SE) Scale and the New/Strange Situations (EMAS-T-AM) Scale of the EMAS-T were administered to participants. Both scales consist of 15 statements which are rated on a 5-point scale ranging from 1: “Not at all” to 5: “Very much”, with total scores for each scale ranging from 15 to 75. The EMAS-T has demonstrated satisfactory reliability and validity as a multidimensional measure of anxiety (Endler, Edwards, Vitelli, & Parker, 1989; Endler, Parker, Bagby, & Cox, 1991b). The two subscales used in the present study have been shown to discriminate between stuttering and non-stuttering samples (Messenger et al., 2004)

7.3.3.9 Overall Assessment of the Speaker’s Experience of Stuttering (OASES) (Yaruss & Quesal, 2006). The OASES consists of four sections, each assessing a different component of the impact of stuttering. The total score is designed to evaluate the total impact of stuttering on a person’s life. Section IV assesses the impact of stuttering on quality of life. This section is scored from 1: “Not at all” to 5: “Completely”. The OASES has demonstrated strong reliability and good validity (Yaruss & Quesal, 2006).

7.3.3.10 Depression, Anxiety and Stress Scales (DASS). The DASS is a 42-item test that aims to capture three dimensions of negative emotional states: depression, anxiety and stress/tension (Lovibond & Lovibond, 1995a, b). The response format is a 4-point scale measuring the frequency of an event in the preceding week. The answers range from "Did not apply to me at all" to "Applied to me very much, or most of the time". The instrument has excellent internal consistency and a replicable three-factor structure (Antony, Beiling, Cox, Enns, & Swinson, 1998; Brown, Chorpita, Korotitsch, & Barlow, 1997; Crawford & Henry, 2003). The DASS aims to address the failure of earlier emotional measures to discriminate between anxiety and depression.

7.3.4 Procedure

The two participants attended the ASRC to give informed consent and to complete the assessment procedures. The assessment involved a comprehensive self-evaluation, using both a laptop computer and comprehensive pencil-and-paper booklet of measures (see above). After the assessment was completed, the participants were given the web address and login details for the "computer psychologist". The participants were not contacted again by any research or clinical staff until after they had completed the treatment with the "computer psychologist". At this point, they were asked to return to the ASRC for completion of the post-assessment measures. These were again conducted using a laptop computer and a pencil-and-paper booklet. It should be emphasized that any emails sent by the participants to the "computer psychologist" during the treatment period were not acknowledged, consistent with the fully automated research design.

7. 4 Results

7.4.1 Psychometric tests

At post-treatment administration of the CIDI Auto 2.1, neither participant met the DSM-IV and ICD-10 criteria for SP. Furthermore, as can be seen in Table 7.1, psychometric testing revealed that both participants experienced large reductions in anxiety and depression symptoms after receiving the intervention by CBTpsych.com.

Table 7.1. Pre-treatment and post-treatment data for both participants.

	User 1 Before	User 1 After	User 2 Before	User 2 After
DSM-IV SP*	YES	NO	YES	NO
ICD-10 SP*	YES	NO	YES	NO
FNE	20	4	23	7
STAI	40	31	55	42
SPAI	153	81	125	87
BDI-II	11	0	19	5
EMAS-T-SE	49	40	46	63
EMAS-T-AM	52	39	58	62
Stuttering impact on quality of life	69	50	69	48
OASES Total Impact	65	47	70	48
UTBAS I	181	102	198	118
DASS	17	3	60	51
AVOIDANCE	138	28	96	49

*SP: Social Phobia diagnosis

7.4.2 Individualized models and behavioural experiments

Participant 1 reported high use of safety behaviours both in the assessment phase and in the cognitive restructuring tasks. Figure 7.3 demonstrates an idiosyncratic model that this participant built with the help of CBTpsych.com.

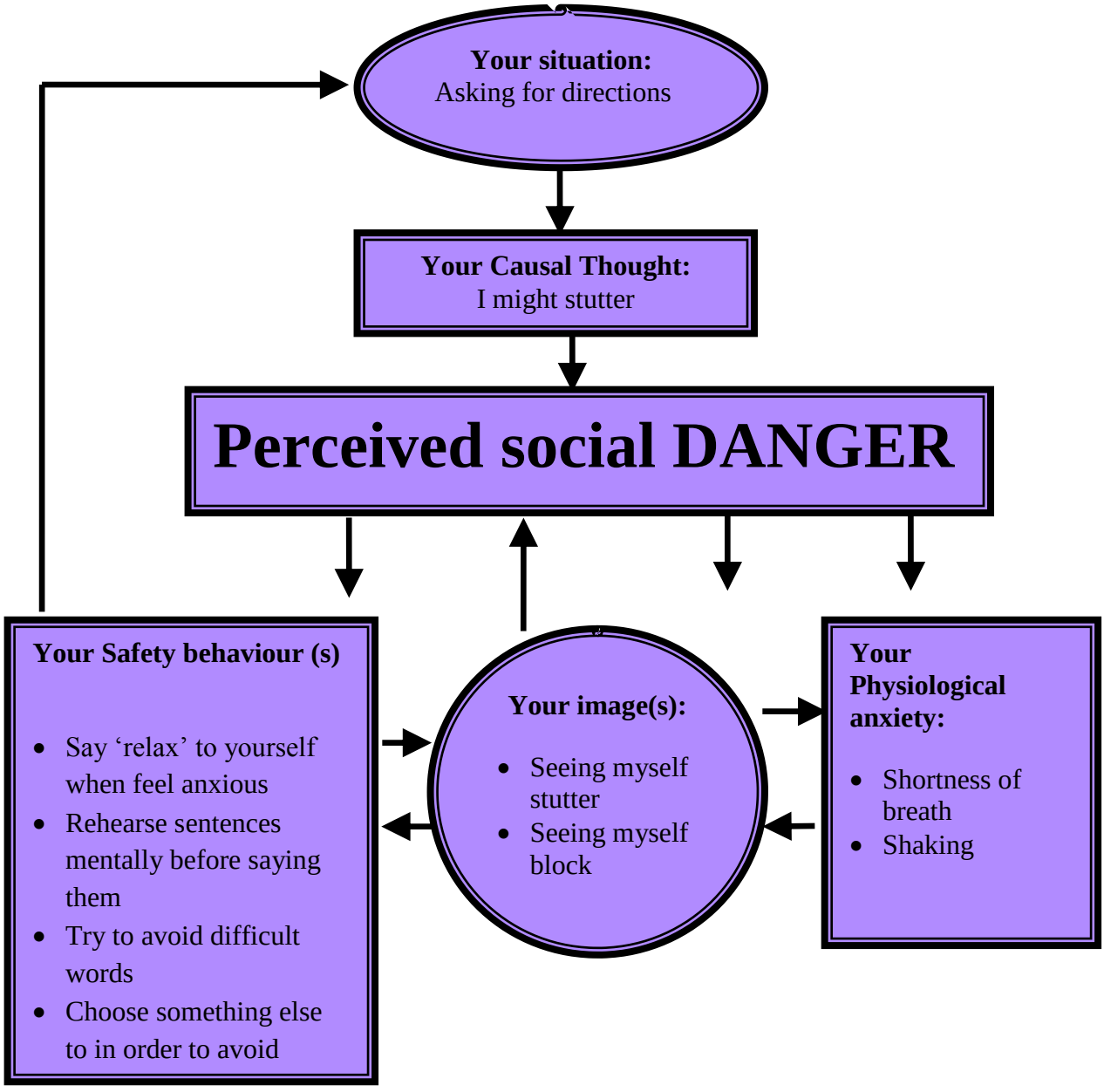

Figure 7.3. Example of Participant 1's idiosyncratic model

This participant engaged in four behavioural experiments during treatment: twice for the situation of "presenting material to a group of people", once for "asking for directions", and once for "asking questions in tutorials". In the first experiment, the participant reported several different unhelpful thoughts and beliefs. Table 7.2 lists all of the different predictions that Participant 1 tested out in these experiments.

Table 7.2. Components of the behavioural experiments for Participant 1

Cognitions:	
7	I might stutter
11	I will stutter
12	Everyone in the room will hear me stutter
Situations avoided:	
45	Asking for directions (general public)
21	Presenting material to group / meeting (work)
21	Presenting material to group / meeting (work) *
29	Asking questions in tutorials (university)
Predictions tested out:	
4	People will not help me out
6	People will laugh at my questions
15	They will not give me a chance to finish my sentence
5	People will turn away when I speak
13	The other person will look at someone else and make a fun of me
7	They will not listen to me when I talk to them
16	I will not be able to explain myself
20	People will laugh when they hear me stutter
14	They are going to shake their heads

* The participant had to perform two behavioural experiments with this situation to reduce anxiety

By examining the written responses of Participant 1, it is clear that he came to realise that he routinely overestimated the likelihood and costs of bad outcomes. Figure 7.4

demonstrates an example of one of this participant's behavioural experiments, and the responses he gave to CBTpsych.com after completing the task.

What did I learn from doing the experiment?

My causal thought was:

I might stutter

The task I completed was:

Walk around your neighbourhood and ask at least five people for directions to a local shop

I predicted these three things:

- I predicted: "People will not help me out" with likelihood: 30%
- I predicted: "People will turn away when I speak" with likelihood: 30%
- I predicted: "People will walk away" with likelihood: 60%

This is what happened:

- Nobody laughed; I was actually surprised that they were helpful and friendly. Some actually engaged in the conversation which was very surprising.
- I didn't see people making fun of me. Everyone was attentive. Although one person laughed and was trying to hide it. Everyone was cooperative and listened what I had to say.
- NO one treated me badly, one person laughed quietly, but realized the situation and it was OK in the end. It was jut a fear I have that was not there at all. I should stop assuming things.

Do you still think you would avoid: *Asking for directions (general public)?*

Figure 7.4. Written response by Participant 1 in a behavioural experiment.

7.4.3 Cognitive restructuring

Figure 7.5 contains an example of Participant 2's cognitive restructuring. On the left-hand side is the restructured thinking by the participant, and on the right-hand side is the feedback which CBTpsych.com gave to him to challenge the unhelpful thought, "It's impossible to be successful if you stutter". As indicated earlier, CBTpsych.com has 528 sample answers to the eight probe questions used in the restructuring component of the program.

Causal thought:

It's impossible to be really successful in life if you stutter

1. What evidence do you have for the thought?

Your answer:	Our sample answer:
I do not have any evidence for the thought. I feel if I do not speak fluent it may not be easy to succeed in life. I think I have to work harder than the normal people to be successful in life but I do not have strong evidence, it is impossible.	Although this feels true, I have no evidence for the thought.

2. What evidence do you have against the thought?

Your answer:	Our sample answer:
Lots of stutterers achieve great things in life. Sometimes I do succeed in life and I don't fail all the time. If I work hard and with luck I may succeed in doing some things. To be successful in life you must have a commitment, be hard working and lucky. It is not impossible to be really successful in life if I stutter, some of my performance can prove it.	There have been lots of very successful people who stutter. These include Aesop (writer of famous fables), Aristotle (famous thinker), Lewis Carroll (writer of Alice in Wonderland), Winston Churchill (English PM during WWII), Claudius (Roman Emperor), Nat King Cole (singer), Richard Condon (Novelist – Prizzies Honour Manchurian Candidate), Charles Darwin (Theory of Evolution), King George VI (King of England), Henry James (Novelist), Thomas Jefferson (US President), Lenin (Russian Communist Leader), Louis II (King of France), Isaac Newtown (Scientist-Law of Gravity), Alan Turing (founder of computer science), Virgil (Roman poet), George Washington (US president), Rowan Atkinson ('Mr Bean'), Jake Eberts (Film Producer-Gandhi, Dances with Wolves), Noel Gallagher (Guitarist-Oasis), Ben Johnson (Athlete), Harvey Keitel (Actor), and Carly Simon (singer)

3. **What would you tell a friend (to help them) if they had the thought**

Your answer:	Our sample answer:
It is absolutely wrong. You can be successful in many things despite you stutter, look at your past performance, you succeed sometime.	Don't be silly! Lots of people who stutter are successful. This thought is so self-defeating. You need to beat it!

4. **Think of your calmest, most rational and supportive friend or family member. How would he/she react to the causal thought? What would he/she say?**

Your answer:	Our sample answer:
It is rubbish to have this thought. No matter you stutter or not if you want to be successful in life you have to work hard with a commitment and sometime depend on luck.	That's rubbish. If you keep thinking thoughts like this, it will just eat away your confidence. Why would you believe such a thought?

5. **Are you worrying about an outcome that you can't control? Is there any point to this type of worry?**

Your answer:	Our sample answer:
If in case it is impossible to be successful if I stutter, I cannot change it with this thought. I must work harder to try it again or to overcome my stuttering. It does not help me if I still have the thought.	My success is largely within my control. I want to be successful. I've got one life to live, and I'm going to go for it!

6. **What does the thought do for you? How does it make you feel? Is it helpful in any way, or is it just distressing?**

Your answer:	Our sample answer:
It discourages me from having a good performance. It stops me from doing something I like. It is not helpful in any way, I just devastate my life with it.	The thought makes me feel sad and helpless. So I guess it is only distressing, since when I am sad and helpless I often end up doing nothing about my situation. The thought stops me from helping myself.

7. What good things would you gain if you gave up the thought? How would your life be different if you didn't believe the thought?

Your answer:	Our sample answer:
If I give up the thought then my life would be cheerful. I have courage and strength to overcome or control my problems. My life will be happier, I will not be anxious and distressful.	If I didn't believe the thought, I would see no limit to my possible achievements, I would be more optimistic. I wouldn't feel robbed of a fair life. I wouldn't be so bitter and angry. I'd just get on with trying.

8. If the causal thought was true, what is the worst outcome? It is as bad as you think?

Your answer:	Our sample answer:
If the thought was true, then I just live a normal life, not everyone is successful in life, I do not die if I am not a successful person.	Even if it was true, I could still be blissfully happy. Why do I pin some much of my worth onto external achievements? I need to learn to be happy with whatever I achieve in life. Life is so short – there just isn't any value in continually thinking about what I could have been if I was more fluent or taller or thinner or smarter. Its all such a waste of time.

Figure 7.5. An example of a cognitive restructuring exercise of Participant 2.

7.4.4 Adherence – time limits and login patterns

Participant 1 completed the program in around 2 months. Figure 7.6 illustrates his pattern of use by showing the number of days between each login. The most common number of days between logins was 6 days. This is interesting, given that a reminder was sent once 7 days had elapsed since the last log on.

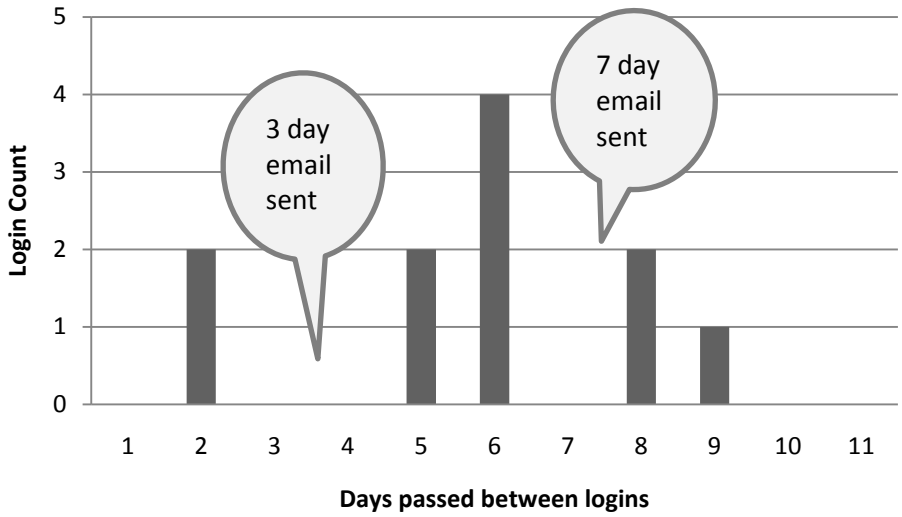

Figure 7.6. Days between logins for Participant 1.

Participant 2 completed the program in 3.5 months. His pattern of login behaviour was very different from that of Participant 1 (see Figure 7.7). At this stage, it is impossible to hypothesize whether the email reminders were helpful in this process due to small numbers and no comparison group. However, this participant logged in every day. The second most common time between his logins was on the fourth day, a day after the 3-day email reminder had been sent. Interestingly, both the participants seemed to engage with the computer on a regular basis. This is an encouraging result, as previous studies of standalone online programs have reported difficulties with client engagement.

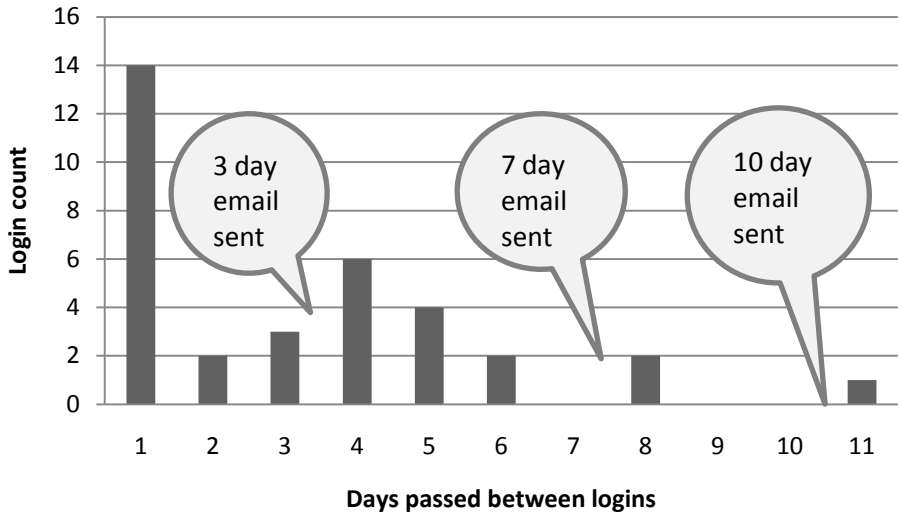

Figure 7.7. Days between logins for Participant 2

7. 5. Discussion

Both participants showed significant improvements in their symptoms following their interaction with CBTpsych.com. In particular, their diagnoses of SP, both on the ICD-10 and DSM-IV, were removed. Post-treatment data was impressive on all instruments administered, except on one scale (EMAS) for one of the participant. In particular, the participants' post-treatment scores on the Fear of Negative Evaluation scale were below community group means in previous reports (Stopa & Clark, D. M., 2001).

CBTpsych.com includes several innovations in online treatment. First, the program opens with a comprehensive and targeted assessment battery. The measures assess faulty intrusive thoughts, as well as avoidance, safety behaviours and physiological responses. This enables

the program to then build an individual formulation consistent with the established cognitive model of SP of Clark D. M. and Wells (1995). This individualised formulation then guides the individual's treatment program. It seems likely that such individualised formulations that guide the treatment process will become a standard component of standalone computer treatment models of the future.

Second, CBTpsych.com addresses the important issue of corrective feedback. To date, none of the currently available standalone programs offers this type of feedback *for all exercises* from the "computer psychologist" for comparison with the individual's responses. This is a serious limitation of current standalone online treatment protocols. Clients may be routinely answering cognitive restructuring questions incorrectly without constructive feedback on these errors. CBTpsych.com provides corrective feedback on all written exercises to help shape participants' responses throughout treatment.

Third, CBTpsych.com includes an automated system to track participants' log-ons. It also periodically sends email reminders to keep up their progress. Together with limiting the time for completing the program, this measure encourages regular completion of online exercises. Data from both participants in this study suggest that these approaches to online treatment programs may be effective in aiding program adherence.

Fourth, CBTpsych.com addresses the challenge of mimicking the therapeutic experience of in-session treatment. The use of voiceovers from two clinical psychologists throughout the program creates the "feel" of moving along the treatment journey with an experienced

guide. This innovation in online treatment also allows leading therapists to reach more individuals simultaneously around the globe. Access to specialist clinicians can be dramatically increased through the use of voice-driven online treatment programs.

Finally, CBTpsych.com ensured that an adequate dose of CBT was received by both study participants. Once the specific negative thoughts and behaviours were identified, a large number of restructuring exercises, behavioural experiments, imagery rescripting tasks, and attentional training procedures had to be completed to progress through the program. Participant 1 had 11 online treatment sessions, with many behavioural tasks completed between each session. Participant 2 had 34 online sessions and also completed a large number of individual exercises between online sessions. Most current standalone programs do not include sufficient repetition of CBT exercises to engender lasting change. CBT dose has been shown to be an important predictor of treatment outcome in several recent studies (e.g. Craske et al., 2006).

The present results are encouraging and suggest that individualized CBT formulations can be the basis of online treatment. The results suggest that substantial gains can be achieved through the use of fully automated and tailored CBT systems. Of course, larger controlled trials are needed to establish the effectiveness of this treatment approach. The next chapter contains the results of Phase II trials that were conducted to estimate the effect size associated with CBTpsych.com.

CHAPTER 8 – PHASE II TRIAL OF CBTPSYCH.COM

8.1 Introduction

A novel paradigm for internet treatments has been introduced for the treatment of social anxiety in stuttering (see Chapters 6 and 7). This treatment approach is aimed at bridging the gap between Eliza (Weizenbaum, 1966) and modern internet treatments for anxiety disorders, by addressing some of the limitations of modern internet treatments (see Chapter 6). A major limitation of current online treatments is that effective online treatment protocols require one-to-one feedback or support for efficacy (Spek et al., 2007). This thesis presents a fully functional implementation of a treatment that has no such contact, but rather attempts to create virtual contact using computer algorithms.

As discussed in Chapter 7, the Phase I trial of CBTpsych.com demonstrated that two participants no longer met the diagnosis of SP on the DSM-IV and ICD-10 after being treated by CBTpsych.com. The same symptom reduction was observed on other psychometric tests, including measures of unhelpful cognitions, behavioural avoidance, and low mood. The quality of the interaction appeared to be similar to face-to-face therapy. The automated techniques were successful in engaging the participants, and encouraging them to log on regularly and complete the treatment.

This chapter presents the results of a Phase II trial of CBTpsych.com. One main goal of the study was to determine whether the power of the CBTpsych.com treatment protocol was sufficient to proceed to a randomized controlled trial.

8.2 Method

8.2.1 Design

A Phase II trial was designed to determine whether there was sufficient evidence for conducting a RCT for the treatment intervention (CBTpsych.com). The study was designed to determine the power and effect size of the intervention. Psychometric tests were used to measure changes before and after the intervention. The importance of conducting effect size analysis of clinical innovation prior to RCT has been highlighted by Clark, D. M. (2004).

A naturalistic design was used, with very lenient exclusion criteria to test for external validity. Treatment did not involve any contact with speech pathologists, psychologists or clinical psychologists. The structure of the intervention was summarized in Chapter 7. Furthermore, all components of CBTpsych.com are incorporated in Appendix 2.

8.2.2 Participants

Eighteen participants seeking treatment for stuttering at the Australian Stuttering Research Centre (ASRC) took part in this trial. They were offered 5 months access to CBTpsych.com. Eligibility criteria for participant inclusion in the present study were: (1) aged between 18 and 70 years, (2) not having seen a clinical psychologist for CBT treatment within the last 6 months, (3) regular access to internet/email, (4) functional written and spoken English, (5) no

endorsement of the suicide item on the BDI-II. The study was approved by the Human Research Ethics committee at the University of Sydney (Appendix 1), and written informed consent was obtained from all participants.

8.2.3 Measures

Psychometric tests were administered before and after the intervention. Three different modes of data collection were used for psychometric testing: an automated diagnostic interview, a pencil-and-paper booklet, and online questionnaires. No therapist contact occurred during psychometric testing. For example, the DSM-IV and ICD-10 diagnoses were obtained using the self-administered, computerized version of the Composite International Diagnostic Interview (CIDI-Auto-2.1; World Health Organization, 1997). A research assistant with no psychological qualifications contacted the participants for the collection of data. Ten tests (see section 7.3.3. for outcome measures) were used to evaluate the participants.

8.2.4 Procedure

The 18 participants went to the ASRC to give informed consent and to complete the assessment procedures. The assessment involved a comprehensive self-evaluation, using both a laptop computer and a pencil-and-paper booklet of measures (see above). After the assessment was completed, the participants were given the online access and login details for CBTpsych.com. Before and after the intervention, CBTpsych.com administered the

online psychometric tests. The participants were not contacted again by any research or clinical staff members until after they had completed the treatment. At this point, they were asked to return to the ASRC for completion of the post-assessment measures. This involved the same assessments as for the pre-treatment measures. It should be emphasised that any emails sent by the participants to CBTpsych.com during the treatment period were not acknowledged, as the goal of the study was to test treatment that involved no human interaction.

8.3 Results

8.3.1 Completion rates for the Phase II trial

Of the 18 participants recruited for the study, 16 started the online treatment. Figure 8.1 shows how far the participants had progressed when their 5-month cut-off time arrived.

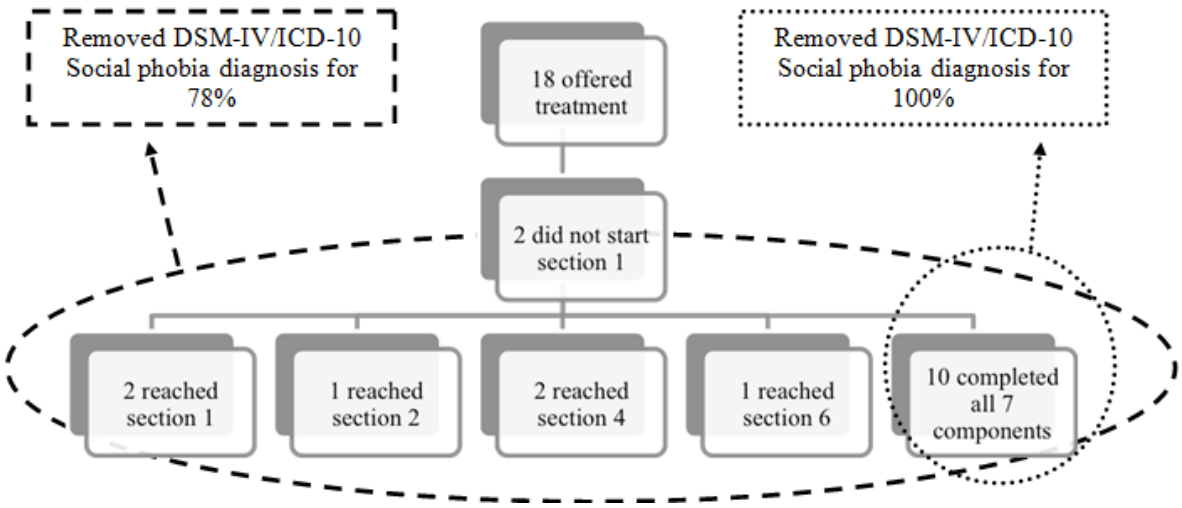

Figure 8.1. Progress of the 18 participants across their 5 month access to CBTpsych.com

The two participants who did not start the intervention also completed only half of the pre-assessment assessment battery. One participant claimed to have been too busy with wedding and travel to be able to start the program. It is unknown why the second participant did not start the program, as a research assistant at the ASRC was unable to get in contact with that participant.

A total of 16 participants started the treatment program. Of these, one person did not return the paper booklet containing the post-treatment questionnaires, and another did not complete the online post-treatment questionnaires.

Two participants completed only the first section of CBTpsych.com. This section incorporates general psychoeducation, but does not include cognitive restructuring, behaviour experiments, or any other specific components of the CBT treatment. One of these participants asked for an extension because of being too busy with university studies during the 5 months access time to the program. In order to comply with the research design, this request was not granted. The other participant, via an email to CBTpsych.com, expressed being frustrated by the lack of individualization in the first part of the program, where general psychoeducation is introduced.

One participant reached part II, which includes cognitive restructuring, and contacted the ASRC asking to speak to one of the psychologists involved in the study. Once again, due to the goal of no therapist interaction, and consistent with ethics clearances and participant information sheets, this request was denied during the 5 months of treatment. This participant stopped use of the program.

8.3.2 Diagnostic interview CIDI 2.1 Auto

The CIDI-Auto-2.1 was administered to the 18 participants pre-treatment. Eleven of these people met the diagnosis for SP. In other words, 61% of these adults who sought treatment at the ASRC suffered from SP. However, two of these people with SP did not start the program, as discussed above. Notably, those with a high number of comorbid diagnoses appeared more likely to complete all 7 components of the program (see Figure 8.2).

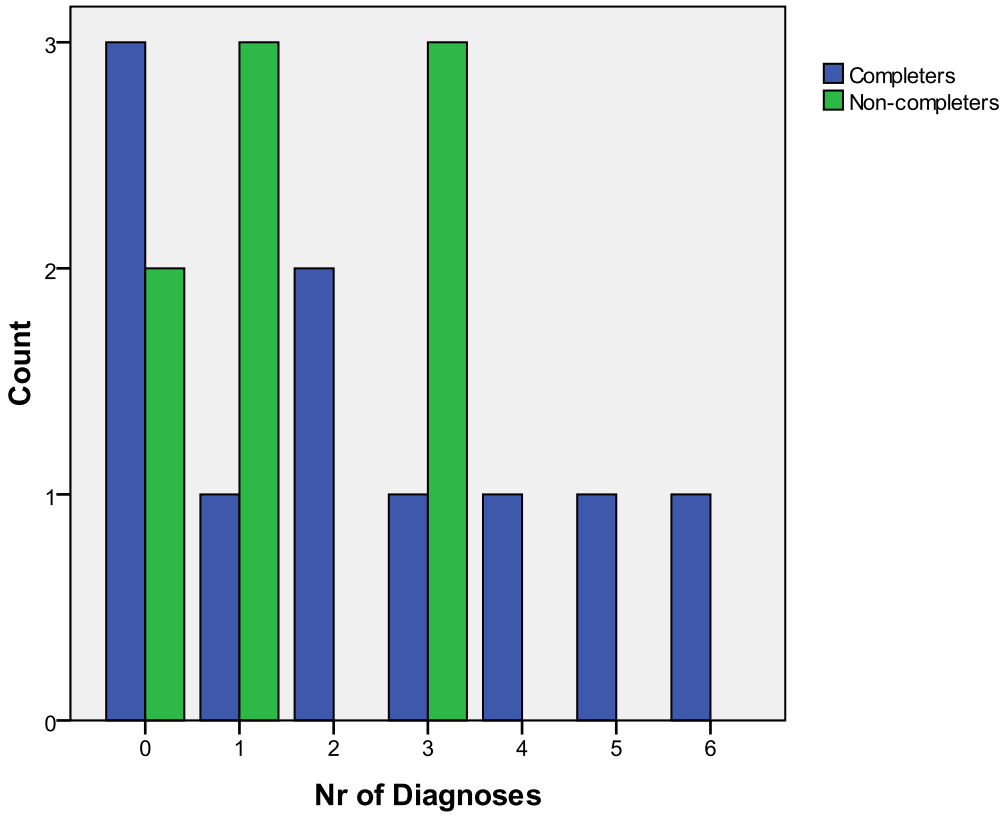

Figure 8.2. Number of diagnoses pre-treatment.

The 10 participants who finished all components in 5 months had on average 2.3 ICD-10 or DSM-IV diagnoses, compared to 1.5 diagnoses for the rest of the group who did not reach the end of the program before the 5-month cut-off. However, this difference did not reach significance.

At post-treatment, a reassessment was conducted for the anxiety disorders, using the CIDI-Auto-2.1. This revealed that only two of the participants still met the criteria for a SP diagnosis on the DSM-IV or ICD-10. Interestingly, these two people only completed 14%

and 29% of the CBTpsych.com intervention. Consequently, 7 of the 9 participants (78%) who had a SP diagnosis before the treatment no longer met the criteria (on DSM-IV or ICD-10) post-treatment. As noted above, the two who did not lose their diagnosis did not complete the program. On the other hand, 100% of those who completed all 7 components of the treatment prior to 5-month cut-off time lost their SP diagnosis on the DSM-IV and the ICD-10.

8.3.3 Online measures within the treatment program

CBTpsych.com administered four measures before and after the treatment intervention as a part of its protocol. Two of the 18 participants who were offered the CBTpsych.com treatment did not complete the pre-treatment online measures. Fifteen of the 16 participants who started the first module of the CBTpsych.com intervention completed the online assessments before and after the intervention. Consistent with an intention to treat approach, the 16th individual's pre-treatment data was also used as "post-treatment" data.

Table 8.1. Online measures pre- and post-intervention for all participants (M ± SD)..

N=16^	Before	After	ES (Cohen's d)	Test statistic
Primary Outcomes:				
FNE	17.81 ± 6.30	10.9 ± 6.75	1.15	*t* (15) = 4.63*
UTBAS	159.4 ± 48.90	117.3 ± 25.97	1.04	*t* (15) = 4.148*
AVOID	90.8 ± 46.58	54.4 ± 29.83	1.02	*t* (15) = 4.067*
Secondary Outcomes:				
Total DASS	28.9 ± 23.94	17.31 ± 16.88	0.70	*t* (15) = 2.808***
Depression on DASS	9.1 ± 9.25	5.0 ± 6.90	0.77	*t* (15) = 3.097**
Anxiety on DASS	6.6 ± 7.10	3.6 ± 3.7	0.60	*t* (15) = 2.058
Stress on DASS	13.5 ± 9.03	8 ± 7.52	0.70	*t* (15) = 2.722***

*$p < .001$ and **$p < .01$ and ***$p < .05$
^ Consistent with an intention to treat approach, the 16th individual's pre-treatment data was also used as"post-treatment" data.

Table 8.1 demonstrates the reduction observed in the 16 participants in symptoms of social anxiety, and reductions in unhelpful cognition and avoidance. As can be seen in the table, large and significant differences were obtained on most measures from pre- to post-treatment. An exception to the general trend was observed on the DASS anxiety subscale, where change from pre- to post-treatment failed to reach significance.

A linear regression was calculated for all the online measures, and the result indicated a significant dose-response relationship for FNE anxiety (see Figure 8.3).

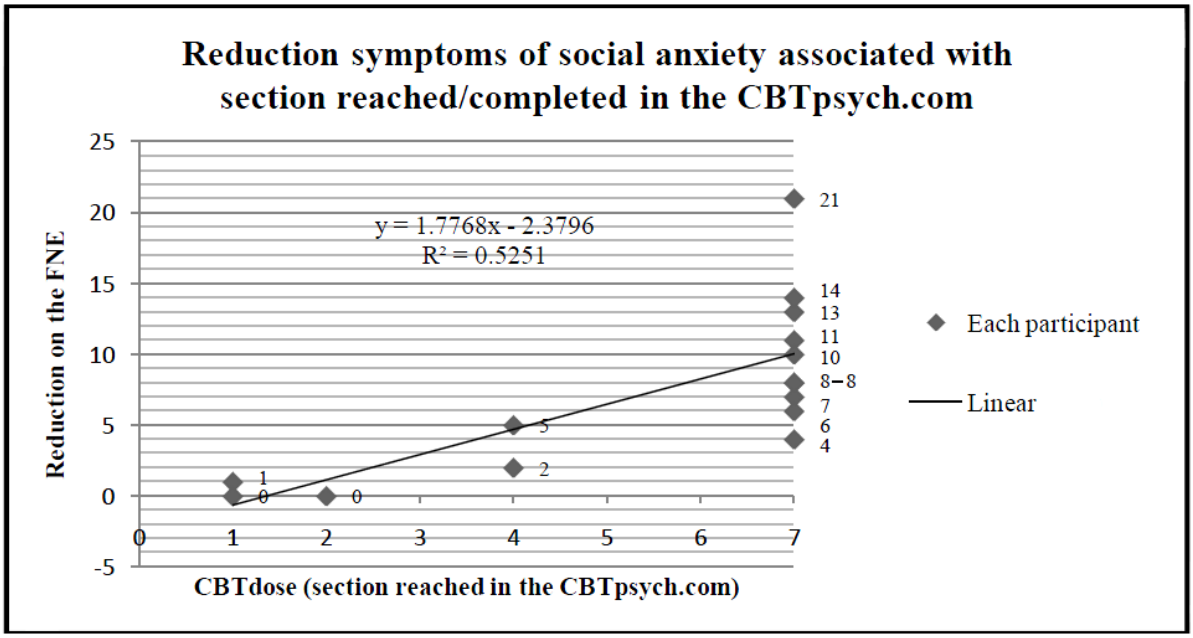

Figure 8.3. The relationship between dose (sections completed) and change in FNE score from pre- to post-treatment.

The horizontal axis indicates which component the participant had reached when the 5-month access to CBTpsych.com was over. The vertical axis is the decrease in participants' scores on the FNE. A linear regression demonstrated that dose of CBTpsych.com was a significant predictor of outcome. In other words, the more the participant completed, the greater the symptom reduction on FNE they experienced. In particular, the dose explained r^2=53% (R) of the variance of change scores.

The core construct of social anxiety is fear of negative evaluation. Therefore, this result is particularly important. Notably, this impact of CBTpsych.com was very strong for the 10 individuals who received the full intervention. These were the participants who reached the

end of the program prior to their 5-month cut-off date. Table 8.2 demonstrates effect sizes for the participants who completed all components of the program.

Table 8.2. Pre-post online assessment for those who received the full intervention (M ± SD).

N=10^	Before	After	ES (Cohen's d)	Test statistic
Primary Outcomes:				
FNE	19.7 ± 6.82	9.5 ±7.81	2.08	*t* (9) = 6.590*
UTBAS	162.4 ±58.97	107.7 ± 25.03	1.29	*t* (9) = 4.081**
AVOID	91.10 ± 57.77	43.90 ± 32.36	1.21	*t* (9) t=3.817**
Secondary Outcomes:				
Total DASS	31.9 ± 27.51	15.0 ± 15.51	0.92	*t* (9) = 2.913***
Depression on DASS	9.4 ± 9.58	3.5 ± 4.35	1.03	*t* (9) = 3.259**
Anxiety on DASS	8.1 ± 8.65	3.6 ± 4.38	0.66	*t* (9) = 2.097
Stress on DASS	14.4 ±10.31	7.9 ±7.95	0.94	*t* (9) = 3.000***

*$p < .001$ and **$p < .01$ and ***$p < .05$
^ Consistent with an intention to treat approach, the 1s individual's pre-treatment data was also used as "post-treatment" data.

8.3.4 The paper and pencil measures

One of the 16 participants did not return the paper booklet after the treatment program. Consistent with the intention to treat approach to the research, pre-treatment data was carried forward to post-treatment for this participant. The same approach was taken with the two

participants who were assessed at pre-treatment but did not begin the program. The following results then were observed for all 18 participants (Table 8.3).

Table 8.3. All participants offered the treatment (including those who did not start and those starting Session 1 only) (M ± SD).

N=18	Before	After	ES (Cohen's d)	Test statistic
FNE	17.8 ± 7.26	11.8 ± 8.03	0.82	*t* (17) = 3.472**
BDI-II	10.9 ± 11.09	6.1 ± 8.71	0.60	*t* (17) = 2.556***
STAI	42.9 ± 10.84	40.9 ± 8.37	0.63	*t* (17) = 1.397
SPAI	99.2 ± 36.17	77.9 ± 27.00	1.01	*t* (17) = 3.187**
Impact on Quality of Life	56.3 ± 15.67	49.1 ± 15.51	0.83	*t* (17) = 3.532**
Overall Impact on Life	59.3 ± 11.84	52.8 ± 11.43	0.85	*t* (17) = 3.613**
UTBAS	169.6 ± 64.63	141.8 ± 59.85	0.85	*t* (17) = 3.586**

*$p < .001$ and **$p < .01$ and ***$p < .05$
^ Consistent with an intention to treat approach, pre-treatment data was also used as "post-treatment" data for all participant whom post-treatment data was not collected.

Consistent with the intention to treat approach, the two individuals who did not start the intervention were included in this analysis and their pre-treatment data was also used as post-treatment data. The same method was used for the one participant who did not return the post-treatment booklet. Despite these limitations, large effect sizes were reached for social anxiety, quality of life and the UTBAS (Cohen, 1992). To understand better the impact of the treatment on those who actually received it a separate analysis was conducted. Table 8.4

presents the results for those 9 participants who received the full intervention and returned their post-treatment booklet.

Table 8.4. Results of the psychometric tests from the paper and pencil booklet for those who received the full intervention (M ± SD).

N=9	Before	After	ES (Cohen's d)	Test statistic
FNE	19.4 ± 8.31	9.1 ± 8.42	1.35*	t (8) = 4.053**
BDI-II	12.4 ± 12.99	3.1 ± 4.05	2.25	t (8) = 3.037***
STAI	43.1 ± 13.71	38.7 ± 7.81	0.56	t (8) = 1.686
SPAI	106.1 ± 42.55	69.8 ± 28.89	1.14	t (8) = 3.432**
Impact on Quality of Life	56.3 ± 15.67	44.1 ± 14.04	1.52	t (8) = 4.550**
Overall Impact on Life	61.6 ± 14.214	50.1 ± 12.68	1.70	t (8) = 5.084*
UTBAS	174.3 ± 66.97	123.3 ± 46.11	1.57	t (8) = 4.719**

*p < .001 and **p < .01 and ***p < .05

High effect sizes were found for those who completed the whole intervention. Notably, the BDI-II demonstrated an ES of 2.25 in pre-post-treatment change. Furthermore, the impact of CBTpsych.com on quality of life reached an ES of 1.52. Finally, the overall impact of stuttering on these participants' lives reached an effect size of 1.70.

8.4 Discussion

The removal of a DSM-IV social phobia diagnosis for those receiving treatment by CBTpsych.com is consistent with the RCT on social phobia in stuttering conducted by Menzies et al. (2008). In that trial, every person in the experimental group who had a social phobia diagnosis prior to the CBT treatment no longer met the diagnostic criteria at post-treatment assessment. The present Phase II trial of a computerised version of this CBT program has produced a similar result. These preliminary data are very promising.

Overall, the results suggest that the computerized treatment protocol can lead to substantial reductions in social anxiety, unhelpful thinking styles and avoidance. This finding was demonstrated by impressive effect sizes, and the high power achieved to detect such change. It is highlighted by the fact every single participant had fewer social anxiety symptoms after receiving treatment by CBTpsych.com. However, these results need to be interpreted with caution since they reflect only the participants who received the full intervention by CBTpsych.com (i.e. all seven parts of the program).

It should be noted that the effect sizes obtained in this study cannot be directly compared against those found in other studies dealing with social phobia. Pre-treatment levels of social anxiety in this stuttering sample were lower than those in other trials involving social phobic patients. Therefore, there was less room for improvement in social anxiety measures in the present trial. This is commonly known as the “floor effect”. Furthermore, this was an open

trial with lenient exclusion criteria. This suggests high external validity due to this being a naturalistic setting.

CBTpsych.com is a treatment focused on treating social anxiety symptoms. However, significant reductions were observed in symptoms of depression on the DASS and BDI-II. This is consistent with the reduction in depressive symptoms observed in CT by Clark, D. M. and his colleagues (Clark D. M. et al., 2006) and in a group-based treatment for social phobia (Marom, Gilboa-Schechtman, Aderka, Weizman, & Hermesh, 2009). Furthermore, it is also consistent with therapist-assisted online treatment protocols for social phobia by Titov, Gibson, Andrews, and McEvoy (2009), who also found significant reduction in comorbid depression when targeting only social phobia. The BDI-II demonstrated greater effect size and power than the depression scale on the DASS, and should therefore be used in any future RCTs of CBTpsych.com.

The tests administered in the paper booklet were included in this study because they are part of the standard assessment battery for individuals seeking treatment for stuttering at the ASRC. The data from the booklet provided further evidence for the impressive effect size and power on the FNE. The high consistency between the booklet and the online data provided further evidence of the significant change observed in this trial.

Data from the paper booklet suggests that the computerised treatment protocols can lead to substantial reductions in anxiety and can improve mood and quality of life as measured by

the FNE, SPAI, BDI-II, UTBAS, and OASES. No significant difference was found on the STAI. Nevertheless, given the excellent power and high effect size for the core construct of social anxiety (FNE scale), a randomized controlled trial should be conducted on the basis of this data.

Finally, the fact that CBTpsych.com succeeded in engaging the participants in multiple exposure tasks and behavioural experiments was beyond the hope of the researchers, due to the difficulty clinicians commonly have in persuading their patients to engage in such experiments. The success of this endeavour was highlighted in the reduction of behavioural avoidance specific to stuttering. Therefore, there is a strong basis for using this avoidance measure in a future RCT on CBTpsych.com. Further work is needed to establish the psychometric properties of the avoidance measure.

In conclusion, the treatment conducted by CBTpsych.com resulted in an intervention that had substantial pre-treatment to post-treatment effect size, which is the prerequisite for conducting a randomized controlled trial (Clark D. M., 2004). Further, the power calculations performed demonstrated that the intervention fulfilled Cohen's (1988; 1992) criteria for adequate power.

In summary, the fully automated computer psychologist achieved the following outcomes with no therapist interaction:

- motivated participants to log on regularly (with the use of an automated email process)
- engaged participants in detailed cognitive restructuring work
- created successful, individualized behavioural experiments for participants
- produced promising preliminary results. These included excellent effect sizes for social anxiety, the removal of all anxiety diagnoses on the DSM-IV and ICD-10, and strong power to detect such change in a randomized controlled trial
- reduced comorbid problems and important underlying cognitive constructs. In particular, CBTpsych.com improved mood, reduced avoidance behaviour and reduced unhelpful thinking styles

CHAPTER 9 - CONCLUSIONS AND FUTURE RESEARCH

9.1 General Discussion

9.1.1 Quality of the CBTpsych.com codebase

Chapters 7 and 8 demonstrated promising results from a fully automated online program that treats social anxiety for those who stutter. The program was written by the candidate who is a clinical psychologist who learned two computer languages (PHP and MySQL) for this thesis. The system, as it stands, is better thought of as a proof of concept, rather than commercial grade software. This is often described as the "alpha phase" in the development of a computer program, whereas the beta phase is conducted after the proof of concept.

Completion of a beta version typically requires a substantial budget. This is because its development would involve a multidisciplinary team of a professional software engineers, graphic designers, and large number of people to perform quality and assurance testing. For example, when Microsoft released the beta version of Windows Vista in January 2005, they used 5219 testers in the first round of testing, and another 5308 testers in February 2006. Yet despite this massive effort Windows Vista still had many flaws when released (http://wikipedia.org/Development of Windows Vista, 2010). This demonstrates that even when a large number people have been involved in testing a system it is still possible for

software problems to remain undetected. For CBTpsych.com, 30 people have tested the computer system to date. However, it is likely that many bugs still exist in the code.

9.1.2 Human–computer interaction – the clinical relationship

It is suggested that participants were engaging with the computer psychologist. This is supported by the observation that there were fewer symptoms of psychopathology after receiving the treatment, and also in the quality of participants' answers. Although empirical evidence of the efficacy of the treatment has not yet been obtained through a RCT, it is encouraging to note that the participants were able to engage in clinical psychology treatment with a fully automated computer system. This brings us closer to reaching the goal of delivering computer-based CBT treatment in a manner consistent with that of a human psychologist.

Delivering CBT treatment through an online medium has several advantages. First, the treatment can be provided at a very low cost, or even cost-free. Secondly, participants can use the system at any time, day or night, whenever it is convenient. This is because the entire treatment is automated. Finally, an unlimited number of people can be involved in the treatment at the same time, yet still receive the same high quality standard of clinical psychology services.

Another important observation from the development of CBTpsych.com is that automated email reminders are very important. The reason for this is that they provide a stimulus to

remind the patient to log on. Another important aspect of the automated emails sent by CBTpsych.com is that they are personalized. For example, they automatically use personal details about the patient to whom they are addressed. It is suggested that this may enhance the computer-patient relationship, although this remains an empirical question. Clearly, future research should examine this area.

9.2 Future research for online social anxiety treatment in stuttering

9.2.1 Randomized controlled trials

Now that it has been established that the effect size and power of CBTpsych.com is sufficient, continuing research is under way. A trial will be conducted using CBTpsych.com, and the design will be analogous to the one utilized by Menzies et al. (2008). The RCT trial in this study delivers "prolonged speech" treatment to both the experimental and control groups. Cognitive behaviour therapy is being offered to the experimental group. The RCT that is under way will use CBTpsych.com instead of a "live" CBT practitioner.

9.2.2 Limitations of CBTpsych.com

A number of limitations of the current system were observed while the trial was conducted. These should be addressed in the next version of this program. First, the current system sends

email reminders when the individual has not logged in for 3, 7, 14, 21 and 28 days. One problem that became apparent was that after the 28 days reminder, the participants no longer received further emails. Ideally, the system would continue to monitor patient activity throughout the 5-month treatment program.

A limitation of CBTpsych.com is that it needs to provide the user with a more functional user interface. For example, features such as an index and an overview of the user's progress would be very useful. This was common feedback from users of the current version.

The programming logic of CBTpsych.com is very complex in some places. For example, the code for formulating behavioural experiments was developed in a very ad hoc manner. The code in these areas needs refining. Furthermore, some parts of the program need further testing to determine their robustness. Finally, the system would benefit from being more flexible. For example, it is the author's view that it should be able to accommodate users who change their mind about answers they made in previous sections.

The current system would also benefit from improvement in its appearance. In particular, a graphic designer is needed to improve the overall aesthetics of the interface. Currently the pictures and artwork in the program are not of a professional quality. Furthermore, all the people in the images of CBTpsych.com are of friends and colleagues of the author.

A further limitation of the current system is that users must perform the tasks in the order specified by CBTpsych.com. It would be more user-friendly to allow users to do some tasks, such as cognitive restructuring, throughout the program. This could be accomplished by using popup windows and menu items that give users more control over their tasks. Finally, and importantly, additional automated processes are needed to give users feedback (e.g. charts and printouts) about their progress throughout the treatment.

Development is already under way to address some of the above limitations in the next version of the CBTpsych.com.

9.2.3 Computer CBT vs. live CBT

A fundamental and important question remains to be answered: can fully automated treatments match or outperform a human clinical psychologist? To date, no such trial exists. Furthermore, as mentioned previously in this thesis, no publication exists of a successful computerised treatment for social anxiety where there was no therapist contact. Both these topics are important for the future of this type of intervention.

One advantage of the computer therapist over a human therapist is that it does not suffer from "therapist drift" (Waller, 2009). This is a relatively common phenomenon in live therapy, where the actual treatment slowly drifts away from the initial treatment plan. Furthermore,

the computer psychologist is not distracted by mundane and irrelevant information, which is a common problem during live therapy.

9.3 Future research for online treatment of generalized social anxiety disorders

The core ideas behind the online treatment program presented in this thesis are applicable to other mental disorders. The reason for this is that the technique at the core of the treatment (i.e. CBT) is the same across a broad range of anxiety disorders. In particular, the goal is to rectify threat perception using cognitive restructuring and behavioural experiments.

Targeting social anxiety in stuttering was useful for the reason that a comprehensive clinical tool from file audit data was published for treatment targeting (St Clare et al., 2008). For the translation of this process into other anxiety disorders, several file audit driven measures are needed for common symptoms of the specific disorders. For example, for mainstream social anxiety the following would be needed: a comprehensive list of social anxiety cognitions and core beliefs, common imagery, and a comprehensive list of common safety behaviours and avoidance. Therefore, future research needs to focus on developing measures such as the UTBAS (St Clare et al., 2008) in order to develop similar interventions for generalized social anxiety. Similar measures need to be developed for other anxiety conditions, such as generalized anxiety disorder, obsessive compulsive disorder, and panic disorder. Only after this information has been extracted from file audit data can the techniques from this thesis be used for treatment delivery for other anxiety disorders.

In the development of this treatment protocol, novel features of the Clark, D. M. and Wells (1995) paradigm were incorporated. This was made somewhat difficult by the dearth of studies on the viable application of each treatment component for those who stutter. An example is the role of video feedback in the treatment protocol. For generalized social anxiety the role of video feedback has been demonstrated to enhance treatment results (Harvey, 2000). However, this cannot be directly translated into the area of stuttering, since anecdotal reports have indicated that seeing video of oneself stuttering or blocking actually makes anxiety and stuttering worse. This component could be included in future online systems using web cameras and other modern technology, if an evidence base in this population for the procedure can be established.

Another component that should be incorporated in future social anxiety treatments for the non-stuttering population is the surveying methods suggested by Clark, D. M. These surveys are meant to gather evidence that people's perception of themselves in a social setting might not correspond to how others see them. This could be accomplished using online technology (e.g. setup of automated email to friends and family, giving sample suggestions to ensure the efficacy of this technique). However, as stated earlier, given research findings on the stereotypes associated with stuttering, exploratory work is needed to establish the viability of this procedure.

Finally, the paradigm introduced in this thesis presents an excellent solution to the problem of disseminating expert therapy to the community at large (Shafran et al., 2009). In particular, it is invaluable for those who would otherwise not have access to such services, such as people

in remote areas, or those who cannot attend therapy for financial reasons. The use of fully automated treatment programs helps to bridge the gap between evidence-based treatments and those who need them.

9.4 Other research directions and final comments

Almost all current research on stuttering is conducted by speech pathologists. However, this has not always been the case. In the 1980s, only 52% of published studies on stuttering were conducted by speech pathologists; 33% were published by psychologists and 14% by physicians (Andrews, Guitar & Howie, 1980). In the past, the goal of therapy conducted by psychologists and speech pathologists was the same; namely, that of reducing the frequency of stuttering. However, as discussed in Chapter 4, clinical psychology has moved from behaviour therapy into an era dominated by CBT.

With the increasing role of cognitive constructs in psychological treatments, the goals of treatment for SAD in stuttering have changed. Today CBT focuses on decreasing mediating cognitive variables of social anxiety (e.g. fear of negative evaluation). The goal is to reduce these mediating variables, encourage engagement in everyday speaking situations and improve quality of life. Notably, CBT does not target stuttering directly and it has not been shown to change the frequency of stuttering (see e.g. Menzies et al., 2008).

The application of CBT in stuttering is new, and it focuses on the same goals as the clinical psychology field today. In particular, it aims to rid people who stutter of their fear of the appraisals of others and to eliminate avoidance strategies and safety behaviours.

The topic of safety behaviours is a subject of some ongoing debate and increasing interest within the anxiety literature (see Chapter 3.5.1). This topic highlights the lack of multidisciplinary communication between the fields of speech pathology and clinical psychology. No discussion of this topic was found in any textbook on stuttering management. As a result of this thesis, the candidate has now completed additional research to identify safety behaviours routinely used in speech restructuring practice. This research was not included as a formal chapter within the thesis, as it is beyond the immediate scope of the present research. However, some mention of this extension of the present work is warranted in this final section on future directions. In essence, this preliminary research suggests that state-of-the art speech treatment for adults who stutter (i.e. prolonged speech treatment) should routinely include attention to safety behaviours that have the potential to stop the extinction of fear in everyday speaking situations. It is further hypothesised that these safety behaviours may be responsible for the maintenance of anxiety disorders seen in stuttering populations. Ongoing research exploring this issue is a future direction that arises from the CBT focus that the present thesis brings to the field of stuttering. It is hoped that an alignment of the goals of speech pathology and clinical psychology in the field of stuttering may emerge from this research effort.

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The University of Sydney

5 May 2008

Associate Professor R Menzies
Australian Stuttering Research Centre
Faculty of Health Sciences
Cumberland Campus – C42
The University of Sydney

Dear Professor Menzies

I am pleased to inform you that the Human Research Ethics Committee (HREC) at its meeting on 1 May 2008 approved your protocol entitled ***"Online Computerized Cognitive Behaviour Therapy (CBT) for anxiety in individuals who stutter".***

Details of the approval are as follows:

Ref No.: ***05-2008/10800***
Approval Period: ***May 2008 to May 2009***
Authorised Personnel: ***Associate Professor R Menzies***
F Helgadottir

The HREC is a fully constituted Ethics Committee in accordance with the *National Statement on Ethical Conduct in Research Involving Humans-March 2007* under *Section 5.1.29*

The approval of this project is **conditional** upon your continuing compliance with the *National Statement on Ethical Conduct in Research Involving Humans.* We draw to your attention the requirement that a report on this research must be submitted every 12 months from the date of the approval or on completion of the project, whichever occurs first. Failure to submit reports will result in withdrawal of consent for the project to proceed.

Chief Investigator / Supervisor's responsibilities to ensure that:

(1) All serious and unexpected adverse events should be reported to the HREC as soon as possible.
(2) All unforeseen events that might affect continued ethical acceptability of the project should be reported to the HREC as soon as possible.
(3) The HREC must be notified as soon as possible of any changes to the protocol. All changes must be approved by the HREC before continuation of the research project. These include:-

- If any of the investigators change or leave the University.
- Any changes to the Participant Information Statement and/or Consent Form.

(4) All research participants are to be provided with a Participant Information Statement and Consent Form, unless otherwise agreed by the Committee. The Participant Information Statement and Consent Form are to be on University of Sydney letterhead and include the full title of the research project and telephone contacts for the researchers, unless otherwise agreed by the Committee and the following statement must appear on the bottom of the Participant Information Statement. *Any person with concerns or complaints about the conduct of a research study can contact the Senior Ethics Officer, University of Sydney, on (02) 9351 4811 (Telephone); (02) 9351 6706 (Facsimile) or gbriody@usyd.edu.au (Email).*

(5) Copies of all signed Consent Forms must be retained and made available to the HREC on request.

(6) It is your responsibility to provide a copy of this letter to any internal/external granting agencies if requested.

(7) The HREC approval is valid for four (4) years from the Approval Period stated in this letter. Investigators are requested to submit a progress report annually.

(8) A report and a copy of any published material should be provided at the completion of the Project.

Yours sincerely

Professor D I Cook
Chairman
Human Research Ethics Committee

cc: Fjola Helgadottir, Australian Stuttering Research Centre, Faculty of Health Sciences, Cumberland Campus – C42, The University of Sydney

Encl. Copy of Approved Participant Information Statement, Copy of Approved Participant Consent Form

The University of Sydney

Human Research Ethics Committee

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30 March 2009

Associate Professor Ross Menzies
Australian Stuttering Research Centre
Faculty of Health Sciences
Cumberland Campus - C42
The University of Sydney
Email: r.menzies@usyd.edu.au

Dear Professor Menzies

Title: Online Computerized Cognitive Behaviour Therapy (CBT) for anxiety in individuals who stutter

Ref. No.: 05-2008/10800
Authorised Personnel: A/Professor Ross Menzies
Ms Fjola Helgadottir

The Human Research Ethics Committee, at its Executive Meeting held on **16 March 2009** considered and approved the following request dated 12 March 2009 to modify the above protocol:

- To recruit from (1) Speak Easy and Toastmaster and (2) previously treated clients at the Australian Stuttering Research Centre.

The Committee found that there were no ethical objections to the modification and therefore recommends approval to proceed.

Chief Investigator / Supervisor's responsibilities to ensure that:

(1) All serious and unexpected adverse events should be reported to the HREC as soon as possible.

(2) All unforeseen events that might affect continued ethical acceptability of the project should be reported to the HREC as soon as possible.

(3) The HREC must be notified as soon as possible of any changes to the protocol. All changes must be approved by the HREC before continuation of the research project. These include:-

- If any of the investigators change or leave the University.
- Any changes to the Participant Information Statement and/or Consent Form.

(4) All research participants are to be provided with a Participant Information Statement and Consent Form, unless otherwise agreed by the Committee. The Participant Information Statement and Consent Form are to be on University of Sydney letterhead and include the full title of the research project and telephone contacts for the researchers, unless otherwise agreed by the Committee and the following statement must appear on the bottom of the Participant Information Statement. *Any person with concerns or complaints about the conduct of a research study can contact the Manager, Ethics Administration, University of Sydney, on (02) 8627 8175 (Telephone); (02) 8627 8180 (Facsimile) or gbriody@usyd.edu.au (Email).*

(5) Copies of all signed Consent Forms must be retained and made available to the HREC on request.

(6) It is your responsibility to provide a copy of this letter to any internal/external granting agencies if requested.

(7) A report and a copy of any published material should be provided at the completion of the Project.

Yours sincerely

Professor **D I Cook**
Chairman
Human Research Ethics Committee
Copy: Ms. Fjola Helgadottir f.helgadottir@usyd.edu.au
Enc. Approved Invitation to Participate

APPENDIX 1 – ETHICS APPROVAL 3

The University of Sydney

HUMAN RESEARCH ETHICS COMMITEE

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3 August 2009

Associate Professor Ross Menzies
Australian Stuttering Research Centre
Faculty of Health Sciences
Cumberland Campus – C42
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[Email: r.menzies@usyd.edu.au]

Dear Professor Menzies

Title: Online Computerized Cognitive Behaviour Therapy (CBT) for anxiety in individuals who stutter Reference: 10800

Thank you for forwarding the Annual Report Form, as requested, for the above referenced study. Your protocol has been renewed to **31 May 2010**.

NOTE:
Any changes to the authorised personnel a Modification Form (www.usyd.edu.au/ethics/human under "Forms and Guides") must be submitted to the Ethics Office.

Yours sincerely

Professor D I Cook
Chairman
Human Research Ethics Committee

cc Ms Fjola Helgadottir [Email: f.helgadottir@usyd.edu.au]