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# INTERNET-DELIVERED CBT FOR CHILDREN WITH ANXIETY DISORDERS - EFFECT AND PREREQUISITES FOR IMPLEMENTATION WITHIN PUBLIC HEALTH CARE

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# Internet-delivered CBT for Children with Anxiety Disorders - Effect and Prerequisites for Implementation within Public Health Care

## THESIS FOR DOCTORAL DEGREE (Ph.D.)

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In loving memory of Gösta Vigerland

# ABSTRACT

**Background:** Anxiety disorders are among the most common mental health problems in children and, if left untreated, increase the risk of impairment and psychiatric illness in the future. Although cognitive behavior therapy (CBT) is a recommended treatment for pediatric anxiety disorders, a large proportion of children do not receive CBT. Internet-delivered CBT (ICBT) is an effective treatment for a range of psychiatric disorders in adults and could be a way of increasing availability to treatment for children.

**Aims**: The aim of the present thesis was to develop and evaluate ICBT for children (8-12 years of age) with a diagnosed anxiety disorder, and to investigate important prerequisites for implementation within regular health care. Specifically, we aimed to investigate the efficacy and feasibility of ICBT for children with specific phobia (study I), evaluate the effect of ICBT for children with anxiety disorders (study II), explore the long-term effects of ICBT (study III), investigate potential predictors of treatment outcome (study III), and explore clinicians attitudes to ICBT for children and adolescents (study IV).

**Methods**: A technical platform for delivering treatment over the internet and a therapist-guided CBT-based treatment program was developed. To test the preliminary feasibility and effect of ICBT, study I included 30 families with a child with a principal diagnosis of specific phobia. They received ICBT for six weeks and were assessed post-treatment and three-months later. Study II randomized 93 families with a child with an anxiety disorder to either ICBT or a waitlist control condition. All participants were assessed ten weeks later, and those randomized to ICBT were also assessed three months after post-treatment. Study III was a long-term follow-up (3 and 12 months) of participants in study II, and included analyses of outcome predictors. Study IV was a survey study conducted at 15 randomly selected CAMHS-units in Sweden, with a total of 156 participating clinicians.

**Results**: Studies I and II showed large within-group effects on clinician rated symptom severity and moderate effects on parent-rated child anxiety. Study II showed that the ICBT group had improved significantly more than the waitlist group at post-treatment. Improvements in the ICBT group continued until three- and twelve-month follow-up (study I-III). About a fifth of those who received ICBT did not fulfill criteria for their principal anxiety disorder at post-treatment, and this proportion increased to about 50% at three-month follow-up (studies I-III). In study IV, we found that clinicians reported seeing several advantages with ICBT and would consider using ICBT for children with mild to moderate problems.

**Conclusions**: Guided ICBT for children with anxiety disorders could be effective in reducing clinician- and parent-ratings of anxiety. ICBT seems to be a promising method, although there is room for improvement. Most clinicians within Swedish CAMHS-units were largely positive towards using ICBT with children and adolescents, especially for mild to moderate problems. Thus, ICBT holds promise for future implementation within regular health care.

# SAMMANFATTNING

**Bakrund:** Ångeststörningar är bland de vanligaste psykiatriska problemen hos barn och ungdomar och ökar risken för funktionsnedsättning och psykisk ohälsa i framtiden. Trots att kognitiv beteendeterapi (KBT) är en rekommenderad behandling för barn med ångeststörningar är det många som inte erbjuds KBT. Internetförmedlad KBT (IKBT) har visat sig vara en effektiv metod för att behandla vuxna med en rad olika psykiatriska problem och skulle kunna vara ett sätt att öka tillgängligheten till behandling även för barn.

**Syfte**: Syftet med den här avhandlingen var att utveckla och utvärdera IKBT för barn (8-12 år) med ångeststörningar, och att undersöka några viktiga förutsättningar för implementering inom reguljär vård. Närmare bestämt ville vi undersöka genomförbarheten och effekten av IKBT hos barn med specifik fobi (studie I), utvärdera effekten av IKBT för barn med ångeststörningar (studie II), undersöka långtidseffekten av IKBT och potentiella prediktorer för behandlingsutfall (studie III), samt undersöka klinikers attityder till att använda IKBT för barn och unga (studie IV).

**Metod:** Vi utvecklade ett behandlarstött IKBT-program samt en teknisk plattform för att förmedla behandlingen via internet. I studie I testade vi den preliminära effekten och genomförbarheten av IKBT genom att 30 barn med specifik fobi genomgick sex veckors IKBT. De följdes upp efter behandlingen och tre månader senare. I studie II randomiserade vi 93 barn med olika ångeststörningar till antingen IKBT eller väntelista och sedan följdes alla barn upp efter tio veckor. IKBT-gruppen följdes också upp tre månader senare. Studie III är en långtidsuppföljning (tre och tolv månader) av deltagarna i studie II och en undersökning av prediktorer för behandlingsutfall. Studie IV var en enkätstudie som genomfördes bland 156 kliniker på 15 slumpmässigt utvalda BUP-mottagningar runtom i Sverige.

**Resultat**: I Studie I och II fann vi stora effekter på klinikerskattad svårighetgrad av ångest och måttliga effekter på föräldrarnas skattningar av barnens ångest. Studie II visade att barnen i IKBT-gruppen förbättrades signifikant mer under behandlingstiden än barnen som stått på väntelista. IKBT-gruppen fortsatte att förbättras fram till tre- och tolvmånaders-uppföljningen (studie II-III). Ungefär 20% och 50% av de som genomgick IKBT uppfyllde inte längre kriterierna för sin huvudsakliga diagnos vid behandlingsavslut respektive tre månader senare (studie I-III). I studie IV fann vi att kliniker var förhållandevis positiva till att använda IKBT med barn och ungdomar, framförallt för barn med lindriga eller måttliga problem.

**Slutsatser**: Behandlarstödd IKBT för barn med ångeststörningar verkar vara en effektiv metod om man ser till klinikers och föräldrars skattningar av barnets ångest. IKBT är en lovande metod, även om det finns utrymme för förbättringar. De flesta kliniker inom BUP rapporterade att de såg många fördelar med IKBT och att de skulle kunna tänka sig att använda IKBT för barn och ungdomar med lindriga till måttliga problem. Sammanfattningsvis ser förutsättningarna lovande ut för en framtida implementering inom reguljär vård.

# LIST OF SCIENTIFIC PAPERS

I. Vigerland, S., Thulin, U., Ljótsson, B., Svirsky, L., Öst, L-G., Lindefors, N., Andersson, G., Serlachius, E. Internet-Delivered CBT for Children with Specific Phobia: A Pilot Study. *Cognitive Behaviour Therapy*. 2013; 42(4): 303–314. http://doi: 10.1080/16506073.2013.844201.

II. Vigerland, S., Ljótsson, B., Thulin, U., Öst, L-G., Andersson, G., Serlachius, E. Internet-delivered cognitive behavioural therapy for children with anxiety disorders: A randomized controlled trial. (Submitted manuscript)

III. Vigerland, S., Serlachius, E., Thulin, U., Andersson, G., Larsson, J-O., Ljótsson, B. Long-term outcomes and predictors of Internet-delivered cognitive behavioral therapy for childhood anxiety disorders. (Manuscript)

IV. Vigerland, S., Ljótsson, B., Bergdahl-Gustafsson, F., Hagert, S., Thulin, U., Andersson, G., Serlachius, E. Attitudes towards the use of computerized cognitive behavior therapy (cCBT) with children and adolescents: A survey among Swedish mental health professionals. *Internet Interventions*, 2014;1(3):111–117. doi:10.1016/j.invent.2014.06.002

# CONTENTS

# LIST OF ABBREVIATIONS

| | |
|---|---|
| ADIS | Anxiety Disorders Interview Schedule |
| ASD | Autism spectrum disorder |
| CAMHS | Child and adolescent mental health services |
| CBT | Cognitive behavior therapy |
| cCBT | Computerized cognitive behavior therapy |
| CGAS | Children's Global Assessment Scale |
| CSR | Clinician severity rating |
| FSSC-R | Fear Survey Schedule for Children-Revised |
| GAD | Generalized anxiety disorder |
| HADS | Hospital Anxiety and Depression Scale |
| ICBT | Internet-delivered cognitive behavior therapy |
| OCD | Obsessive compulsive disorder |
| OST | One-session treatment |
| QoL | Quality of life |
| QOLI-C | Quality of Life Inventory-Child version |
| SAD | Separation anxiety disorder |
| SCAS-C/P | Spence Children's Anxiety Scale – Child and parent version |
| SoP | Social phobia |
| SP | Specific phobia |

# 1  INTRODUCTION

## 1.1  FEAR AND ANXIETY

### 1.1.1  What is fear and anxiety?

Fear can be described as a normal and evolutionary adaptive response to a perceived or real threat, preparing us to escape from or attack the feared stimuli (1), and Barlow described fear as a cognitive-affective structure within a defensive motivational system (2). The fear response consists of behaviors, a physical response and cognitions, or subjective feeling of distress, that typically occur simultaneously or sequentially (3). Many times, physical responses are immediate, such as jumping at a loud noise or at the sight of a snake in the grass, while cognitions or feelings can take somewhat longer to arise (1). Although physical symptoms of fear can vary largely between individuals, increased heart rate, trembling, feeling faint, flushing/chills and sweating are common complaints among frightened children (4). The fear response will be largely influenced by cognitive processes, for example if we perceive the situation as threatening or not, and how we judge our ability to cope with the threat (5-7).

To some extent, what we fear, and how fear is expressed, is determined by inheritance and evolution. However, there are aspects of fearfulness that are influenced by socialization and experience (1). For example, although most childhood fears relate to the threat of death or danger, reported fears can include "My getting pregnant or getting my girlfriend pregnant", which does not make any sense from an evolutionary standpoint, but is more understandable based on certain cultural contexts (8).

Anxiety, in contrast to fear, can be described as an apprehension about a future event, or as a fear response when no actual threat or danger is present. Similarly, Marks described a phobia as a fear that is exaggerated, cannot be reasoned away, is not under voluntary control and leads to avoidance of the feared stimuli. Importantly, the fear response is largely the same, regardless of whether the threat is actual or perceived (1,3). Anxiety, like fear, can range from a mild reaction to a novel situation, to an anxiety attack with several physical symptoms and a feeling of impending doom.

### 1.1.2  Normal fear

Fear, often being an adaptive response, is very common among children. One study found as many as 76% of children (4-12 years of age) reporting fears, and 67% reporting being worried about different things (9). Several early studies on the prevalence of fear in non-clinical samples show similar high prevalence rates (3). A review of the development of normal fears showed that while younger children are more afraid of threatening stimuli in their surroundings (loud noises, strangers, animals, darkness), older children become more fearful of imaginary or abstract stimuli (school performance, social situations, political events) (10). As mentioned above, fear is a normal response and there are many situations and objects that are highly adaptive for children to fear and avoid. Relatedly, children with

low socioeconomic status report being more fearful of physical violence, drug dealers, rats and cockroaches, while children with higher socioeconomic status more often report fear of school-related situations, heights, car accidents or train wrecks and dangerous animals in general (10).

Most studies, across countries and cultures, show that girls report more fears than boys. (10). However, there is some evidence that suggests that difference in reported fear levels can partially be explained by gender role orientation, rather than biological sex (11,12). This suggests that the higher prevalence of fear in girls may be a result of girls being more willing to report fears, rather than actually having more fears.

### 1.1.3 Prognosis of normal fear

The commonness of certain fears at certain ages suggests that fears will dissipate with time, or at least give way to new fears (13). According to a review of Gullone (10), most longitudinal studies show that normal fears decrease over time, especially in younger children. The exception is social fears, which tend to have their onset during adolescence and then increase (3).

When does fear become a problem, and normal fear become pathological? There are several aspects to consider, some of the most important being; is the fear stable over time? Is it inappropriate for the child's age? Does it lead to avoidance? Does it cause problems and impairment for the child or the family? If so, it might fulfill criteria for an anxiety disorder.

### 1.2 ANXIETY DISORDERS

### 1.2.1 Why do children develop anxiety?

There are several theories about the etiology of anxiety. Although the most probable explanation is a complex interaction of several biological and psychosocial factors, a brief overview of the suggested causes will follow.

#### *1.2.1.1 Heredity*

Even in very young children differences in temperament and personality can be observed. Some children are more likely to get anxious and, once anxious, are less likely to habituate {Anonymous:2011vq}. They also display more fear-related behaviors, physical responses and thoughts than other children. This has been called behavioral inhibition, neuroticism, or anxiety proneness (3). Research has shown that behavioral inhibition in young children is associated with fulfilling criteria for social phobia, but not other anxiety disorders, in adolescence. It is important to note that although high behavioral inhibition is thought to increase the likelihood of a subsequent social phobia-diagnosis it does not determine it. Also, research suggests that children with high behavioral inhibition can become less inhibited or avoidant if their parents are encouraging and provide the child with opportunities to engage in novel situations (3).

Anxiety is said to run in families, and there is evidence to support this claim. For example, one study found that about 40% of children to parents with an anxiety disorder also had an anxiety disorder, while only 1% of children of non-disordered parents met criteria for an anxiety disorder (14). The relative risk among children of parents with anxiety disorders is estimated to be 3.5 compared to healthy control parents (15). Conversely, among children with anxiety disorders, 66% of parents had an anxiety disorder, compared to 38% in a non-psychiatric control group (16). The familial relationship of anxiety does not seem to be specific, meaning that parents and children do not necessarily fear the same situations. They may for example be diagnosed with different anxiety disorders (3). Similarly, when looking at genetic factors through twin studies, it seems that a tendency towards anxiety, rather than a specific disorder, is inherited (3). Furthermore, there seems to be little evidence of specific genes corresponding to a specified anxiety disorder. On average, the effect of genetic factors on the risk of developing an anxiety disorder is estimated to be about 30%, with specific phobia being thought to have a slightly larger genetic component (3). Although some studies have shown that specific genes are more linked to specific psychiatric disorders in certain environments, there are still few studies on gene-environment interaction regarding anxiety (17).

### 1.2.1.2 Learning

Rachman (18) suggested that fears can be learned, or acquired, in three different ways; through classical conditioning, vicarious learning or verbal information transfer. Classical, or associative, conditioning can happen through a single aversive event, or cumulative events that may not objectively be interpreted as aversive, that creates an association between the stimuli and the fear response (3,19). Observational learning enables us to fear things without experiencing an aversive event connected with that stimulus. Several studies have shown that children can acquire the same fear as their parent, even when the parent does not display fear openly but merely passively avoids the situation or stimulus (3). Conversely, it has also been suggested that observing non-fearful individuals coping with a situation may serve as a protective factor against fear acquisition (20). Studies on verbal information transfer of fear show that some children display more anxious behavior after negative comments or negative information about a novel or ambiguous situation (21). This is of course very adaptable, as there are many things we want children to fear without having to experience it themselves, for example the potential dangers of traffic, boiling water and sharp tools.

A fourth pathway of fear acquisition; non-associative learning or preparedness for fear, has been proposed (3,22,23). It postulates that we are biologically predisposed towards some fears and that no specific learning has to occur for fear to develop. These predisposed fears would be evolutionary relevant, for example fear of heights, darkness, or potentially dangerous animals such as snakes etc. (20,22). Retrospective reports of the onset of child fears supported all four types of learning (24).

## 1.2.1.3 Parental factors

It has been suggested that parenting style could play a part in developing trait anxiety (a continuous characteristic of non specific anxiety symptoms) in children, while specific parenting behaviors may contribute to the development of specific anxiety disorders (25). A review by Wood et al. could not show any conclusive support for parental style being associated with trait anxiety (26). Parental controlling behavior, however, has consistently shown to be associated with diagnostic status (27), and is thought to contribute to both the child's appraisal of a situation as threatening, and to the child's beliefs about her or his ability to cope with the situation,

It has also been suggested that parents of anxious children are more critical, express less warmth, are more catastrophizing and less likely to encourage psychological autonomy (26,27). Moreover, a recent meta-analysis found an overall moderate association between insecure attachment, especially ambivalent attachment, and anxiety (28), while the broader concept of family dysfunction has been found to be predictive of psychopathology in general, rather than anxiety disorders in particular (27).

Since very few longitudinal studies of the relationship between parent behaviors and child anxiety have been conducted, the directionality of the association is unclear (26). Furthermore, some studies show that both parental and child anxiety can predict certain parental behaviors. For example, one study suggested that maternal overprotective behavior was associated by the child's anxiety, rather than the other way around, while maternal catastrophizing was more related to whether the mother was anxious or not (29). To complicate things further, the context in which the parental behavior appears can moderate the effect of the behavior on child anxiety (26). It has also been suggested that parents react with negative parenting when they are unwilling to experience their own distress that is caused by seeing their child express negative emotions (30). Thus, parent behavior and child anxiety may be related in more complex interactions than a simple causal relationship.

Finally, a meta-analysis estimated that negative parenting only had a small effect on child anxiety and statistically accounted for 4% of the variance (31). The explained variance increased to 8% when including only studies using observational measures, highlighting the impact of methodological differences and suggesting that some of the inconsistencies regarding the influence of parental factors may be explained by differences in study design.

In summary, we do not yet know enough to predict which children will develop anxiety disorders and which will not. It is generally accepted that both genetic and environmental factors play a role in the development of anxiety disorders (17). However, a more clinically relevant question than why a specific child develops anxiety is perhaps the question of what maintains it.

## 1.2.2 How is anxiety maintained?

Mowrer proposed a two-factor theory learning process, where the fear, following respondent conditioning, is maintained by operant learning, i.e. the consequences of the behavior (32). For example, avoidant behavior of a feared stimulus will be reinforced by fear reduction and thus, the avoidant behavior is likely to recur. This will, in turn, prevent the individual from learning that their fear is excessive and unnecessary. The environment's reactions to fearful behavior play an important part in maintaining anxious behavior. For example, a child that expresses fear before a school presentation and is allowed to stay at home and watch TV with a parent will probably be more likely to exhibit fear and want to avoid the situation next time it arises. The behavior of a child will constantly interact with the environment and be shaped over time (7). Sometimes anxiety persists over time even though the individual repeatedly seems to be able to cope with the feared situation. This could partly be explained by the use of safety behaviors (33), which further prevents the disconfirmation of catastrophic beliefs and thus maintains anxiety. Thus, anxiety can be maintained and continue even if the conditions that were present when the anxiety first developed are no longer present or relevant.

## 1.2.3 Description of anxiety disorders

Anxiety disorders are characterized by different fears and typically feared situations and are described for instance in the Diagnostic and Statistical Manual of Mental Disorders published by the American Psychiatric Association (34). The anxiety disorders relevant for this thesis will be described shortly below. All anxiety disorders share the criteria that the anxiety must be excessive and lead to clinically significant distress or impairment in everyday life for the diagnostic criteria to be fulfilled.

### 1.2.3.1 Generalized anxiety disorder

Generalized anxiety disorder (GAD) is characterized by excessive worry about several life domains (for example health, school, performances, novel situations, catastrophes etc.). These children can be described as "worry-warts" who constantly worry about something. Children with GAD often ask parents or teachers many questions to seek reassurance about their worries. Worry should be present more days than not for the past six months for diagnostic criteria to be fulfilled.

### 1.2.3.2 Panic disorder

Panic disorder is characterized by recurring panic attacks paired with worry about new attacks and fear about the consequences of the attacks (e.g. die or lose one's mind). Panic disorder is unusual in youth and even more so in children. When present, children seldom have explicit catastrophic beliefs about the attacks, but will commonly report to be afraid of for example feeling nauseous.

### 1.2.3.3  Separation anxiety

Separation anxiety disorder (SAD) is defined as an excessive fear of being apart from attachment figures, most often parents but sometimes siblings, or being away from home. It is most common among younger children, although the DSM-V now recognizes that the disorder can be present in adults. These children are typically anxious of being left alone, even for short periods of time, and may not want to attend sleepovers, or even play dates, at a friend's house. The often have trouble sleeping or spending time alone in their own room and it is common that they share a bed with a parent.

### 1.2.3.4  Social Phobia

Social phobia (SoP; Social anxiety disorder in the new DSM-V(35)) can be described as an excessive fear of being evaluated and negatively judged by peers. Social situations in which the child is the center of attention, such as speaking in front of the class, being assertive towards peers, performing or approaching friends or classmates, cause anxiety and are typically avoided

### 1.2.3.5  Specific Phobia

Specific phobia (SP) is an excessive and persistent fear of an object or a situation that has been present at least six months. The criteria state that encounters with the feared object almost always evoke anxiety, as many phobic objects are things that many people dislike or feel uneasy about. Specific phobias are grouped together in types, namely, situational (e.g. airplanes, being in enclosed spaces); Animal (e.g. dogs, spiders); Blood, injection, Injury; Natural environment (e.g. thunder, heights), or Other (e.g. vomiting).

## 1.2.4  Prevalence and onset

Prevalence rates of anxiety disorders in youth vary over studies using different methods and samples, but are estimated to be around 10% (15,36), making them among the most common mental disorders for this age group. Prevalence rates for the different disorders and their typical onset are presented in Table 1 (3).

Table 1. Prevalence and typical age of onset of pediatric anxiety disorders

|  | Prevalence | Typical onset |
|---|---|---|
| GAD | 3-15% | 10-13 years of age |
| PD | 1%* | Adolescence |
| SAD | 3-5% (1.6%*) | 7-9 years of age |
| SoP | 3-12% | 11-13 years of age |
| SP | 2-5% | From 7 years of age |

GAD= Generalized anxiety disorder; PD=Panic disorder; SAD=Separation anxiety disorder; SoP=Social phobia; SP=Specific phobia

As with normal fear, girls report a higher rate of anxiety than boys; one review reports the average female-to-male ratio to be 2.3:1 (15). However, the age of onset does not seem to differ between boys and girls (15).

## 1.2.5 Prognosis

Studies following anxious children over time, ranging from six months to six years, have found that the presence of anxiety disorders persists over time in a large proportion of children (40-50%) and that an additional 25-30% of children fulfill criteria for a related disorder at follow-up (3). Only around 20-25% of children will not fulfill criteria for any disorder at follow-up, and it has been found that anxious children are more likely to develop another disorder, compared to children who have never had a psychiatric disorder (3,37).

Anxiety disorders are associated with suffering and impairment in everyday life for the affected individual as well as within the family and among relatives (3,15,38-40). Moreover, a childhood anxiety disorder also increases the risk for future mental health problems; such as anxiety disorders, depression and substance abuse (41-44); and for impairment during adolescence and adulthood, for example in work, studies, and independent living (40,43-45). Thus, early discovery of anxiety can spare the child and family from a great deal of suffering. The fact that anxiety disorders are also associated with increased societal costs is yet another reason why it is important to successfully identify and treat anxiety in childhood {Waghorn:2005up, Weissman:1999vp, Anonymous:2008hp}.

## 1.2.6 Comorbidity

For anxiety disorders in children, comorbidity is the rule rather than the exception. Between 51-91% have a comorbid psychiatric disorder and around 50% have a comorbid anxiety disorder (3). In fact, due to their common comorbidity, GAD, SAD and SoP are sometimes referred to as the anxiety triad (47), and in a large treatment study in the United States (the CAMS trial) a majority of children presented with this particular combination (48).

There is some evidence that comorbidity can vary with age and over disorders. For example, adolescents show more comorbidity that younger children, and a comorbid mood disorder is more likely in children with SoP or GAD, compared to children with SAD, who in turn have higher rates of comorbid specific phobia (3). Kendall and colleagues suggested that children, who are still developing, may have a general problem with anxiety but symptoms that fall into varying diagnostic categories across development (48).

## 1.2.7 Assessment of anxiety disorders

The high degree of comorbidity, together with the fact that different disorders can have overlapping symptoms, highlights the importance of making an assessment thorough enough to assign the right diagnosis or diagnoses. For instance, avoiding sleepovers could be explained by for example separation anxiety, fear of the dark (SP), panic disorder or generalized anxiety disorder. The use of a structured or semi-structured interview can ensure that the assessor asks about all relevant areas in a reliable way.

The most comprehensive clinician administered interview for assessing anxiety disorders is the Anxiety Disorders Interview Schedule – Child and Parent version (ADIS C/P) (49). The ADIS is a semi-structured interview that assesses diagnostic criteria for different psychiatric disorders according to DSM-IV (34). Parents and children are interviewed separately and the final assigned diagnoses takes both interviews into account. The ADIS C/P has shown good to excellent reliability and concurrent validity (50,51). Other diagnostic interviews, such as the DAWBA, K-SADS or MINI-KID (52-54) do not emphasize the anxiety disorders in the same way as the ADIS, which is considered the gold standard in pediatric anxiety research.

### 1.2.7.1 Agreement between parents and children

Even when structured assessments are used, challenges in diagnosing child anxiety arise. Research has shown that there is typically low to moderate agreement between child and parent report regarding presence of psychiatric symptoms (55-59). Some studies have found that parents report more diagnoses than children (57,59), but agreement between parent and child report has been found to be low even when parents are instructed to predict how they think their child would respond (60).

It also seems that parents report more behavioral problems than children in clinical settings, while the reverse is true for non-clinical settings (59). And parents' ratings of their own anxiety were inversely related to agreement, so that higher parental anxiety scores were associated with lower parent-child agreement. Other studies have shown that high levels of maternal stress are associated with reporting more child problems (59,61). Moreover, there seems to be a tendency for higher child-parent agreement when children are older. However, the effect has been found to be small, not always significant, and levels of agreement do not increase to acceptable levels with older children (57,58,62). In more recent studies, agreement between parent, child and clinician was found to be higher when continuous measures of symptoms were used, rather than a dichotomous measure (56,63). Thus, the low agreement between parents and children is not a fixed phenomenon but seems to vary between different contexts. With regard to the ADIS interview, research that has shown that clinicians are more influenced by parent report when assigning diagnoses, especially with younger children (57,62).

## 1.3 PSYCHOLOGICAL TREATMENT OF ANXIETY DISORDERS IN CHILDREN

### 1.3.1 Cognitive behavior therapy

Cognitive behavior therapy (CBT) is a psychological treatment based on learning theory and cognitive theory, that also takes the individuals emotional experiences into consideration (7). It is an active, structured and goal-directed approach that aims to help anxious patients by changing cognitive and behavioral responses in feared situations (7,64). There are several proposed mechanisms for how CBT produces behavior change and fear reduction. It has for example been proposed that CBT works by changing the cognitive fear information structure associated with the feared situation, where the appraisal of the feared stimuli is changed, or by inhibitory learning, in which a new learning experience, where the stimuli does not evoke

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fear, takes place and is added to the original conditioning of fear (6,65). Regardless, CBT is acknowledged as the treatment of choice for anxiety in adults (66).

To date, CBT is the treatment for children and adolescents with anxiety disorders that has been investigated the most, and meta-analyses show that approximately 60-65% of children respond to treatment (67,68). A recent Cochrane report showed that CBT has a moderate to large effect on diagnostic status and self-reported anxiety symptoms compared to waitlist control. However there are relatively few studies comparing CBT to a credible comparison intervention, and CBT has not been shown to be significantly superior to treatment as usual or active control conditions (psychoeducation, supportive therapy, attention control and bibliotherapy) (67). Furthermore, although uncontrolled follow-up studies have found that treatment gains can be maintained from nine months up to seven years after treatment (69-71), the few studies that have looked at controlled long-term outcomes have shown inconsistent results (67). Thus, although CBT is the treatment method which to date has the largest empirical support, there is room for improvement. There are also inconclusive results regarding how CBT should be delivered. While Reynolds et al. found individual CBT to be more effective than group CBT in children and youth (72), other meta-analyses have not shown consistent results in favor of any treatment format, i.e. individual, family-based or group CBT (67,73), indicating that CBT principles can be successfully delivered in different formats.

*1.3.1.1  Content*

One of the first treatment protocols evaluated for children with mixed anxiety disorders was the Coping Cat, developed by Kendall (74). Coping Cat is a transdiagnostic anxiety treatment, originally delivered in an individual setting. Treatment consists of about 16 sessions; the first half of treatment consists of anxiety management skills, including psychoeducation and recognizing anxious cues, coping strategies; such as helpful self-talk and relaxation; and rewarding brave behavior (75). During the second half of treatment, exposure is introduced and carried out in a graded manner in and between sessions. Almost all subsequent studies and treatment protocols for childhood anxiety disorders include similar components (76). For some anxiety disorders, diagnose specific treatments have been tested and found to be effective, for example for specific phobia and group CBT for social phobia (68).

In Kendall's 1994 study, the role of the parents was described as "active collaborators" and parents had at least one meeting with the psychologist (74). Since then, the role of parents has received a lot of attention. Although meta-analyses have found that parental involvement does not improve outcomes, it has been suggested that involving parents in treatment may be more important, and more beneficial, if the parents suffer from anxiety themselves (72,77,78). Moreover, a recent meta-analysis suggested that parental involvement focusing on contingency management and transfer of control (from therapist to parent) improved treatment outcome at long-term follow-up, although short-term effects were not boosted (79).

In recent studies, interventions to reduce anxiety have even investigated the efficacy of specifically targeting parent-child interactions (80).

As already mentioned, CBT for children with anxiety consists of many different components. To date, there is still relatively little knowledge of which components are most beneficial for anxious children. Although it is often said that exposure exercises are one of the most important components of CBT for anxious children (47,81,82), there is limited empirical evidence to support this claim. Firstly, one argument that has been brought up is the fact that, in one of the initial studies of Coping Cat, improvement could not be seen until after the second half of treatment, when exposure had been introduced (83). Secondly, treatments that rely heavily on exposure, such as one-session treatment (OST) and behavioral treatment for youth with social phobia, have yielded positive outcomes (68,84,85). Thirdly, Ale and colleagues, leaning partly against the large effect sizes of CBT treatments for obsessive-compulsive disorder (OCD), argue that exposure is likely the most potent component for anxiety and that there is little evidence to support the need for relaxation strategies prior to exposure (76). In addition, reviews of meta-analyses suggest that exposure therapy may be sufficient in the treatment of OCD and SoP (86,87). Fourthly, improvement in global functioning has been found to be positively associated with exposure and negatively associated with other anxiety coping strategies (88). Lastly, one study found that activities like rewards and homework, typically exposure related activities, predicted positive treatment outcomes (89). Although Kendall showed that cognitive changes can mediate treatment outcome (90), he also pointed out that cognitive interventions may be to demanding for young children (91). And recent a recent study suggested that exposure-related exercises, rather than cognitive interventions, mediated treatment outcome {Kendall:2015ca}. Thus, although there is limited support for the idea that exposure exercises are the most important ingredient of anxiety treatment, there are some findings that point in that direction.

Relatedly, homework assignments are described as an integral part of CBT which allows the child to repeatedly practice the newly learned skills in a setting outside the therapists office and without the presence of the therapist (92). However, homework compliance has not been found to predict treatment outcome in children and adolescents (93,94), although a recent meta-analysis in adults found a small to medium effect (95).

### 1.3.1.2 CBT has limited reach

Although CBT is the treatment of choice for childhood anxiety disorders, far from all receive treatment. Studies show that anxiety disorders, in spite of being highly prevalent, have a lower likelihood of being treated than other psychiatric disorders (96,97). Different reasons for this have been suggested, for example that young people with internalizing disorders are not perceived as disruptive, in contrast to children with externalizing disorders, and therefore will not be pushed to treatment by their parents to the same extent (96). Alternatively, it could be that health care professionals are less updated on available and effective treatments for anxiety and are less likely to recommend treatment (97). The same problems exist for adults, with CBT often being delivered sub-optimally, if available at all (98). Given the risk for

negative consequences of untreated pediatric anxiety there is a great need to make sure that a greater percentage of children with anxiety disorders are offered and receive evidence based treatment.

## 1.4 INTERNET-DELIVERED CBT

Internet-delivered CBT (ICBT) can be described as a therapist-guided self-help intervention, or "net-bibliotherapy", with built-in therapist support (99,100). The treatment content is typically delivered through a website in consecutive modules, consisting of texts, images, audio files and/or videos, during a specified time period. Therapist support is often given in the form of written messages, more similar to email than chat or instant messaging, or through telephone calls (101).

ICBT has the potential to increase the availability of CBT since it enables treatment to be carried out over large distances without having to schedule an appointment with a psychologist during office hours. Furthermore, since ICBT seems to require less therapist time than face-to-face treatment (102-104), a larger number of patients could be treated and, as a result, waiting times could be reduced and clinicians would be able to spend more time on complex patients for whom ICBT may not be an option. Another potential advantage is the reduction of therapist drift, a phenomenon common in face-to-face treatment (87,98,105), and the increased focus of exposure in everyday contexts, which could be beneficial for fear reduction (65).

Studies over the last decade have continuously shown that ICBT is an effective treatment for anxiety disorders in adults, as well as for a broad range of other psychiatric and somatic disorders (104,106). ICBT has been found to be both cost-effective and, for some disorders, as effective as face-to-face treatment (104,107). In some regions of Sweden, ICBT is available within regular health care for adults with depression, irritable bowel syndrome, panic disorder and social anxiety disorder (108,109).

### 1.4.1 ICBT for children and adolescents

To date, there are several trials evaluating ICBT for children and adolescents with anxious or depressive symptoms (111-113). As the field is still emerging, there are also some computerized (as opposed to internet-delivered) CBT programs (cCBT), and quite a few programs focusing on prevention rather than treatment of an identified disorder. Although cCBT can lend support to the concept of therapist-guided self-help programs, ICBT holds some important advantages over cCBT. For example, CD-ROM is an outdated medium that does not include built-in remote therapist contact, and it is harder to extract data on participant activity. Internet-delivered treatments using web-camera sessions, which has been researched for other disorders, e.g. OCD (114), still require full-length appointments between therapists and patients and, thus, do not offer the same time- and cost-saving possibilities as ICBT.

To the best of my knowledge, there is only one set of existing researched ICBT programs for children and adolescents with identified anxiety disorders; the BRAVE-ONLINE programs (115-117). In a first study, March, Spence and Donovan compared an internet-delivered program for children (8-12 years) with anxiety disorders to a wait-list control and found a large significant difference in decrease of clinician rated severity of anxiety favoring ICBT (115). Effects on parent-rated child anxiety at post-treatment were small and there were no significant effects on child-ratings of anxiety symptoms. In a later study, Spence et al. compared BRAVE ONLINE to clinic-based CBT and a waitlist control for adolescents with anxiety disorders (116). Participants who received BRAVE ONLINE improved significantly more than the waitlist control and not significantly less than the clinic based group. Effects between ICBT and waitlist control were large on clinician rated anxiety but non-existent on child and parent-rated measures of anxiety symptoms. In 2014, the same group evaluated a version of the BRAVE program for parents of pre-school children with anxiety disorders (117). Similar to previous studies, they found effects in favor of ICBT compared to a waitlist control.

Other programs that target anxiety disorders in children and youth, but are not internet-delivered, include Khanna and Kendall's "Camp-Cope-A-Lot", Stallard and colleagues' "Think, Feel, Do" and Wuthrich's "Cool Teens" (118-120). Table 2 gives an overview of relevant studies. Not included in the overview are two small trials on computerized vicarious exposure to spider phobia (121,122), which are quite different from the focus of this thesis. In summary, clinician rated measures show consistently large effects compared to a waitlist control group, while child and parent reported anxiety symptoms show mixed results. Furthermore, guided bibliotherapy, which shares some characteristics with ICBT, has been shown to be superior to waitlist control for children with anxiety (68,123). Taken together, there is promising support for the feasibility and efficacy of ICBT.

### 1.4.1.1 Role of parents in ICBT

In face-to-face CBT, parents are automatically involved to a certain extent, for example through scheduling sessions and homework arrangements (75). In ICBT, the content and form of therapist contact with parents must be planned beforehand and built in to the structure of the program. In the BRAVE-ONLINE program for children, parents received 6 separate parent-directed sessions focusing on psychoeducation about anxiety and information on contingency management, relaxation training, cognitive restructuring, graded exposure and problem solving (115). The role of the parent was to assist the child in understanding and using the presented skills. In the CD-ROM based Cool Teens, parents were instructed to support their adolescents and had three separate calls with a therapist on how to accomplish this, but received no parent-directed computer content. "Camp-Cope-a-Lot" included two face-to-face parent sessions.

*1.4.1.2 Long-term outcomes*

Previous studies on ICBT for children and adolescents with anxiety have suggested that treatment gains from guided self-help can be maintained or even continue to improve during long-term follow-up periods between six and twelve months (115,116). Similar results have been found for bibliotherapy (123,124). Although these results were not compared to a control group they do suggest that treatment gains can last over an extended time period. Thus, there is limited but promising support for the long-term outcomes of ICBT.

Table 2. Studies on internet- or computer-delivered CBT for children and adolescents with an identified anxiety disorder.

| Study | Delivery mode | Sample size | Target age group | Anxiety disorders | Treatment details | % Dx free in Tx group | Between-group effect size^ |
|---|---|---|---|---|---|---|---|
| March 2009 | Internet | 73 | 7-12 | GAD, SAD, SoP, SP | 10 sessions/weeks Six parent sessions Therapist support (email and 2 phone calls) | Post: 30% FU: 75% | Clinician: Large* Parent: Small * Child: None |
| Spence 2011 | Internet | 115 | 12-18 | GAD, SAD, SoP, SP | 10 sessions/weeks 5 parent sessions Therapist support (email and one phone call) | Post: 34% FU: 55% | Clinician: Large* Parent: Moderate Child: None |
| Donovan 2014 | Internet | 52 | 3-6 | GAD, SAD, SoP, SP | 6 parent sessions, 10 weeks. Therapist support (email and one phone call) | Post: 39% FU: 52% | Clinician: Moderate* Parent: Moderate* Child: Not included |
| Khanna & Kendall, 2010 | CD-ROM | 49 | 7-13 | GAD, SAD, SoP, SP, PAD | 12 sessions, 15 weeks 2 live parent sessions Six sessions completed in presence of coach | Post: 81% FU: Not reported | Clinician: Large* Parent: Not included Child: Small |
| Stallard et al., 2011 **(119)** | CD-ROM | 20 | 11-16 | GAD, SoP, SP, PAD, | Six sessions/weeks Completed in presence of coach | Not reported | Not reported |
| Wuthrich et al., 2012 **(120)** | CD-ROM | 43 | 14-17 | GAD, SAD, SoP, SP, PAD, OCD, anxiety NOS | 8 sessions 12 weeks Therapist support (8 telephone calls) | Post: 41% FU: 26% | Clinician: Large* Parent: Large* Child: Large* |

^effects size compared to control group on clinician-, parent- and child-ratings of anxiety; *Statistically significant effect; Dx=principal anxiety diagnosis, GAD=Generalized Anxiety Disorder, NOS=Anxiety disorder Not Otherwise Specified, OCD=Obsessive Compulsive Disorder, PAD=Panic Disorder, SAD=Separation Anxiety Disorder, SoP=Social Phobia, SP=Specific Phobia, Tx=ICBT/cCBT group

## 1.4.2  Is ICBT the solution?

As previously mentioned, ICBT carries many advantages and could be one way of increasing availability to cost-effective evidence based treatment for children with anxiety disorders. For children and adolescents, the benefits could potentially be even greater than for adults. In face-to-face CBT, both parents and children need to take time off from work and school to attend appointments during office hours, and parents might also have to travel from work to pick up their child in school before the appointment, taking even more time from work. This could be almost completely avoided with ICBT. Furthermore, it is often the case that only

one parent accompanies the child to face-to-face treatment and thus the non-present parent must rely on the memory and explanation of others to learn about the child's problems, treatment content and homework assignments. Through ICBT it is possible for parents and other important adults in the child's life to take part of treatment content and therapist contact.

However, before ICBT for children can start to fulfill these hopes, there are several steps that need to be taken. First of all, ICBT for children with anxiety disorders needs to further prove its efficacy in more rigorously controlled clinical trials. For example, Reyes-Portillo et al. considered BRAVE ONLINE to be probably efficacious, but pointed out that the results needed to be replicated by other research groups to further increase the evidence-base level (113). Furthermore, when and if ICBT is proved sufficiently efficacious, it needs to be successfully implemented and disseminated so that it spreads from the university clinics to a larger public.

## 1.5 BARRIERS TO IMPLEMENTATION

Implementation within health care can be described as a planned process and systematic introduction of an innovation in the daily routine of a practice (125). Greenhalgh defined *implementation* as "active and planned efforts to mainstream an innovation within an organization" and *dissemination* as "active and planned efforts to persuade target groups to adopt an innovation" (126). As the concepts are similar and both are relevant for this thesis, they will be used interchangeably.

Studies on the diffusion of other technology-delivered interventions, have shown that the step from research to implementation is often slow or unsuccessful, despite the proposed advantages (127,128). Possible barriers in the first steps of implementation could for example be that the target group is not familiar with the innovation, is not interested in it, has no knowledge or understanding of the innovation, or has negative attitudes about it. It has been suggested that a rigorous analysis of these factors should be undertaken before attempting an implementation (125), and some of the prerequisites important for successful implementation, namely attitudes and knowledge, will be examined closer in this thesis.

### 1.5.1 Attitudes

Attitudes can be defined as a persons evaluation of an object, for example a person, a specific treatment or a method (129). Negative attitudes (for example seeing disadvantages, or considering something unfeasible in a specific setting) have been identified as a common barrier to implementing innovations into health care, and several theories of the process of implementation include attitudes toward the proposed change (99,125). Clinician acceptance has even been proposed to be the key factor in successful implementation of e-health services (128,130). Other related aspects that contribute to the degree of acceptance of a new innovation are perceived usefulness and perceived ease of use, and the attitudes of colleagues (125,131,132). Thus, factors outside the individual, such as the design of innovation itself and the social context, can also influence attitudes and, in turn, successful dissemination.

Several studies have shown that innovations that are compatible with the intended target group's values and norms are more easily adopted (126). Conversely, negative attitudes, for example that the new method is not compatible with a clinician's values, education or style, have been found to be one of the most common barriers in for example the adoption of new psychotherapy methods (133). While attitudes are highlighted as an important part of successful implementation of new interventions, there are relatively few studies on mental health professional's attitudes on ICBT.

In the United Kingdom, Stallard and colleagues conducted a survey among 43 clinicians to investigate their attitudes towards using cCBT with children and adolescents (134). A majority of the clinicians reported that they would consider using cCBT with children, and were positive towards using cCBT as prevention or an intervention for mild to moderate problems. They also reported seeing cCBT as a less effective option than face-to-face CBT. However, these clinicians were an oppurtunistic sample attending a CBT-conference. In a previous study by Whitfield et al. of attitudes towards and usage of cCBT with adults among 329 therapists, a majority reported that they would consider using cCBT in the future, but as a supplement to face-to face therapy rather than an alternative (135). Despite cCBT programs being available at the time of the study, only 2% reported using cCBT in their clinical practice. Similarly, MacLeod et al. found that only around 10% among 254 CBT-therapists reported using used computerized or internet-delivered materials, respectively (136).

In Australia, Gun et al. explored the acceptability of internet-based treatments for anxiety or depression among health professionals and lay people (137). Internet-based treatment was rated acceptable for mild and moderate, but not severe, disorders and there was no significant difference in the acceptability ratings between health professionals and lay people. In New Zealand, Fleming and Merry investigated the attitudes of youth work service providers in focus groups and semi-structured interviews and found that they were positive to using cCBT in their services (138).

In Sweden, the attitudes and experiences of primary care psychologists using ICBT in a research project were investigated and found to be positive, in spite of certain technical and practical problems (139). However, the participating therapists had volunteered for the study, were interested in and had some knowledge about ICBT prior to the study.

Wangberg and colleagues did an early survey of Norwegian psychologists' use of email and text-messages within therapy and found that a dynamic theoretical stance was negatively related to positive attitudes towards email and text-message use, and a positive attitude correlated with a higher degree of usage in their own work (140).

In summary, clinicians seem to be positive towards the use of computerized or internet-delivered CBT, at least for mild to moderate mental health problems. However, so far the usage of cCBT or ICBT seems to be limited despite programs being available.

### 1.5.2 Knowledge and skills

Lack of knowledge and skills are also mentioned as factors that can be potential barriers to implementation (125,141), partly because it can affect attitudes towards the intervention. Knowledge could for example be information about when and how to use an intervention, or how effective an intervention is. A review over implemented e-health interventions showed that success was associated with a clear description of the problem or challenge that the intervention was intended to solve (127), indicating that a broad knowledge over both the "how" and "why" of an intervention may be important.

In the British study by Whitfield (135), a majority of clinicians were not familiar with the available cCBT programs, and a large proportion reported not having knowledge about the outcome evidence of cCBT. A majority also stated that they would require increased knowledge and skills before being able to use cCBT with clients. Other studies have also shown that clinicians bring up lack of knowledge or training as a barrier for usage of cCBT (137,138).

### 1.5.3 For whom is ICBT effective?

To date, studies show that clinicians are positive about ICBT (or cCBT) for mild to moderate problems, but are more skeptical towards using ICBT for more severe or complex problems (134,137). Perhaps they are right? Learning for whom ICBT is likely to be a successful intervention, and when ICBT should not be recommended, is a crucial step in understanding how, and in what setting, ICBT should be offered. But, in the light of the importance of attitudes on implementation, it is also important to provide clinicians with correct information, and to be able to respond to their fears regarding the usefulness and safety of ICBT.

To the best of my knowledge, no prediction analyses of ICBT in youth have yet been published. However, it is likely that some of the predictors relevant for face-to-face CBT are important also when treatment is internet-delivered. Recent reviews and large studies have shown inconclusive evidence that symptom severity, comorbidity, parental psychopathology, and caregiver strain may be associated with treatment outcome (142-144). Studies have also shown that children with autism spectrum disorder (ASD) may not benefit as much from CBT as typically developing children (145,146).

Unlike face-to-face CBT, where the therapist is responsible for both explaining important treatment concepts and modeling new behaviors, ICBT relies heavily on parents' ability to act as therapists or coaches to their children. Therefore, ICBT may be more vulnerable to parental psychopathology, or other family problems. Furthermore, families where the child fulfills criteria for several anxiety disorders may find it hard to differentiate between disorders and know what problems to focus on. Without a knowledgeable therapist present to guide them, comorbidity could be a potentially complicating factor in ICBT. In ICBT for adults, studies on predictors of treatment outcome in adult ICBT are inconsistent (101),

although a larger number of completed modules has shown to be predictive of greater treatment outcome (110,147,148).

With regard to ASD there could be both disadvantages and advantages with ICBT. On one hand, children with ASD often present with more complex problems that highly standardized ICBT may not be able to accommodate. On the other hand, the structured and visually supported way of presenting information in ICBT (using for example illustrations and animations), and the benefit of therapist support without having to interact with a therapist face-to-face may suit children with ASD (149).

## 1.6 SUMMARY

Anxiety disorders are quite common among children and increase the risk for future impairment if left untreated. Although CBT is a recommended treatment for children with anxiety disorders, it is not available to all those in need. There is some evidence, mainly from the vast adult literature but also from a few promising studies in children and adolescents, that internet-delivered interventions could increase the availability of effective treatments. However, before ICBT is implemented it is important that the effectiveness of ICBT is evaluated and that we know for whom ICBT is effective (or at least if there are some groups for which ICBT is not effective or even harmful). Moreover, a successful implementation will need to consider important factors such as clinicians' knowledge and attitudes toward ICBT.

# 2  AIMS

The overall aim of this thesis was to develop and evaluate internet-delivered CBT for children (8-12 years of age) with anxiety disorders, and to investigate some prerequisites for implementation of ICBT for children within public health care. The specific aims of each study are presented below:

## 2.1  STUDY I

The aim of study I was to test the preliminary efficacy and feasibility of ICBT for children with specific phobia. We hypothesized that ICBT would lead to improvement on symptoms of SP, global functioning and quality of life.

## 2.2  STUDY II

This study evaluated the efficacy of ICBT for children with anxiety disorders compared to a waitlist control using a randomized controlled design. We expected children in the ICBT group to show greater improvement than children randomized to a waitlist condition.

## 2.3  STUDY III

The aim of study III was twofold. Firstly, we aimed to investigate the long-term outcomes (12 months) of ICBT for children with anxiety disorders. Secondly, we aimed to explore potential baseline predictors of treatment outcome.

## 2.4  STUDY IV

This study explored the attitudes of clinicians within Swedish Child and Adolescent Mental Health Services towards cCBT for children and adolescents. We also wanted to explore if attitudes differed depending on rurality or theoretical orientation.

# 3   SUMMARY OF THE EMPIRICAL STUDIES

The outcome studies I-III share some common aspects with regard to the ICBT intervention and outcome measures. These are first described briefly, and the details of each individual study will follow.

## 3.1   ICBT INTERVENTION

### 3.1.1   Development of ICBT intervention

The first step of the work behind this thesis was to develop an ICBT treatment program and a technical internet platform through which the program could be delivered. Experienced clinical psychologists led the development of the treatment program and, using the crucial points of treatment as a starting point, we started to build a technical platform together with experts on interaction design and professional programmers. We decided to build a simple platform, intended for research and clinical trials rather than large-scale implementation, trying to minimize costs and development time. Since then, the platform has been, and is still, under constant improvement. Some technical solutions that were not in place when the first studies were conducted, for example logging therapist time and participant activity in the platform, have now been added for use in subsequent trials.

### 3.1.2   Description of ICBT intervention in the present thesis

The ICBT program in studies I-III can be described as a guided self-help program directed at parents and children. The program consisted of 11 modules and was divided into four phases; 1) psychoeducation for parents, 2) psychoeducation for children, 3) exposure exercises and 4) maintenance and relapse prevention (see Table 3 for an overview). Parents were instructed to work with the parent-directed material first, containing psychoeducation and instructions on how to help their child, before they introduced the child to the program. Thus, parents were prepared to assist their child on the child-directed modules.

There was no set schedule for the treatment, apart from the maximum number of weeks (6 in study I and 10 in study II-III). However, we did recommend that parents and children completed the first two psychoeducation phases during the first two weeks. Families were also instructed to complete the last modules (modules 10-11) during the final one or two weeks of treatment. In the time in between, families were to work with exposure exercises and to report their progress through the platform. No new modules or treatment content were presented during the exposure phase.

The treatment program focused mainly on exposure. Parents and children were given the rationale for exposure and were taught to set achievable goals and make a fear hierarchy. The program also included general psychoeducation about fear and anxiety, an introduction to coping strategies (breathing, relaxation and simple mindfulness exercises), problem solving skills and how to use a reward system. These two latter strategies were presented as voluntary techniques that the families could chose to implement if they wished.

Table 3. Overview of treatment content (weeks in parenthesis pertain to the treatment program in study I)

| Phase | Week | Module | Content | Directed at |
|---|---|---|---|---|
| Phase 1 | 1-2 | 1 | Psychoeducation on emotions, fear and anxiety | Parents |
| | | 2 | Psychoeducation on anxiety disorders and CBT | |
| | | 3 | Psychoeducation on goals and exposure hierarchies | |
| | | 4 | An introduction to exposure, coping techniques (e.g. breathing and relaxation) and worry time/social skills training (only for GAD/social phobia programs) | |
| | | 5 | An introduction to using a reward system | |
| | | 6 | Preparation for managing obstacles | |
| Phase 2 | 2-3 (1-2) | 7 | Psychoeducation on fear and anxiety | Child |
| | | 8 | Psychoeducation on exposure, setting goals and creating exposure hierarchies | |
| | | 9 | Planning exposures and coping techniques (e.g. breathing and relaxation) | |
| Phase 3 | 4-9 (3-6) | None | Families were instructed to work on their own with exposure exercises and to report their progress in the platform | |
| Phase 4 | 10 | 10 | Problem solving, maintenance plan | Parents |
| | (6) | 11 | Summary, follow-up on goals, maintenance plan | Child |

CBT=Cognitive behavioral therapy; GAD=Generalized anxiety disorder.

We aimed to present treatment content in a brief and varied manner, especially for the children. Reading materials were kept short and child-directed modules contained many animations, illustrations, and exercises (see Figure 1 and 2). The psychoeducation directed to children was shorter than the parent-directed information, and adapted to an appropriate developmental level.

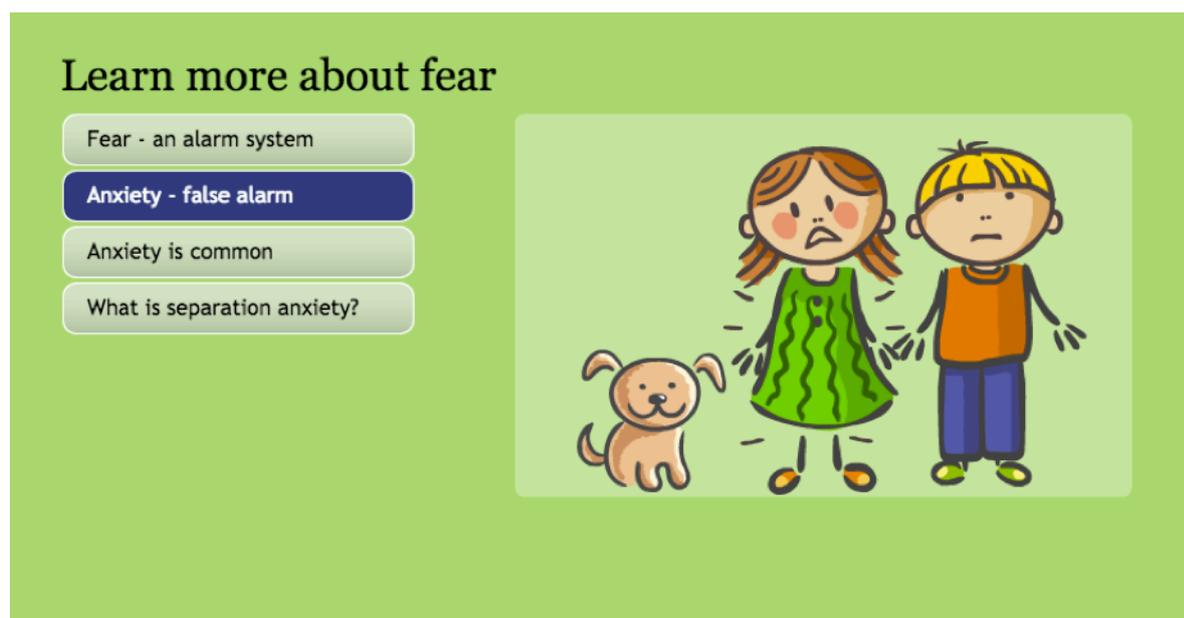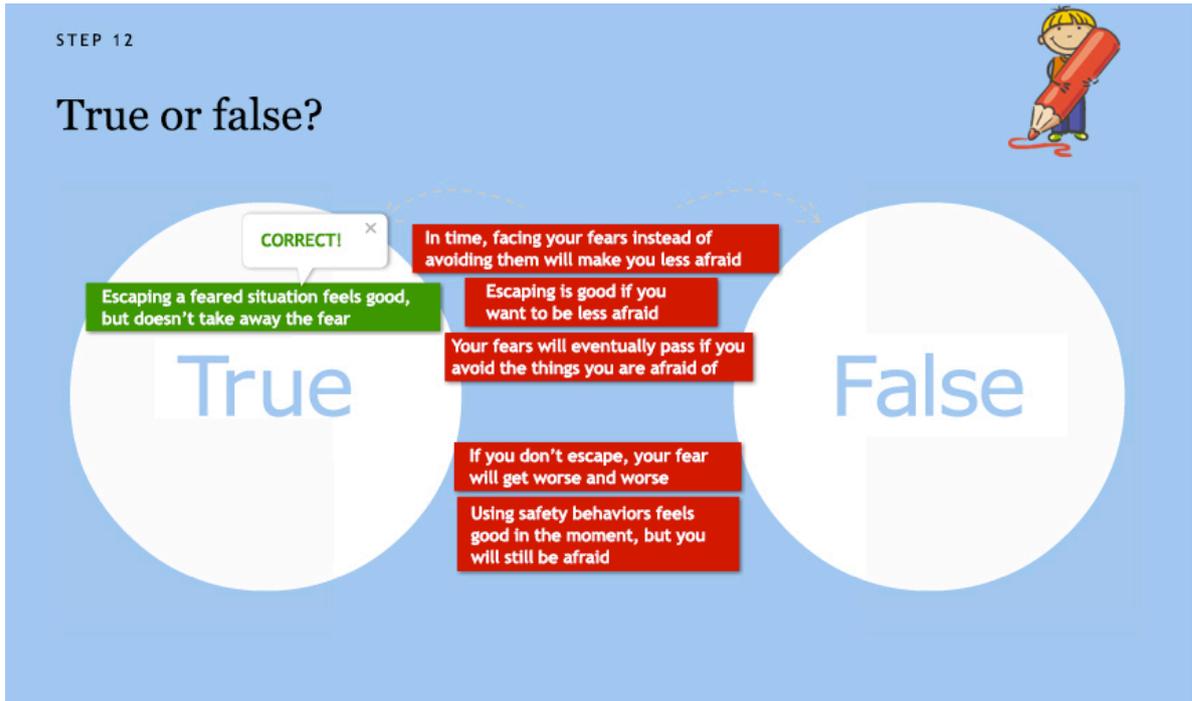Figure 1. Animated psychoeducation for children in the ICBT program

Figure 2. A drag-and-drop exercise for children as part of psychoeducation on fear



The ICBT program was therapist-guided, meaning that participants had contact with an assigned CBT-therapist throughout the treatment. All therapists were clinical psychologist or psychology student supervised by a psychologist. The role of the psychologist was to answer questions, clarify treatment content, help solve problems, and try to increase motivation. Therapists were instructed to refer families back to treatment content rather than suggest other interventions or strategies. In some instances, families were assigned a psychologist that they had met during the baseline diagnostic assessment, but in most cases families had not met their assigned therapist before starting treatment.

Therapist contact was mainly provided in writing through the platform. When a family had worked with a module and completed exercises or questions, they received an individually tailored feedback from their therapist within 48 hours. Families and therapists could also send messages, resembling e-mails, to each other within the platform. Three telephone calls were scheduled during treatment. Therapists called parents at the beginning of treatment to introduce themselves and answer any practical questions about the treatment. The second call, towards the middle of the program, aimed to help parents plan exposures and, if necessary, problem-solve any treatment related issues. The final call was conducted during the last week of treatment, to help parents plan for continued exposure exercises and to say goodbye. Additional telephone calls were conducted if deemed necessary (for example if the family was inactive or had misunderstood critical treatment components).

## 3.2 MEASURES

### 3.2.1 Primary outcome measure

The primary outcome measure in study I-III was the Clinician Severity Rating (CSR) of the principal anxiety disorder derived from the ADIS interview (49). In the ADIS, each diagnosis is assigned a CSR score on a 9-point scale (0-8, higher scores indicating more impairment). A score of 4 or higher corresponds to clinical levels of impairment and fulfillment of diagnostic criteria, while a score of 3 or lower is considered subclinical. In study I-III, baseline assessments were made face-to-face with the child and parent, and all follow-up assessments were conducted with a parent over the telephone. The telephone administration of the parent version of ADIS has shown good to excellent agreement with the full face-to-face administrated interview (150).

### 3.2.2 Secondary outcome measures

The Children's Global Assessment Scale (CGAS) was used in study I-III to assess global functioning in children and adolescents, with higher scores indicating higher functioning (151). The Spence Children's Anxiety Scale – Child version (SCAS-C) measures symptoms of anxiety and consists of 44 items, with higher scores indicate high levels of anxiety (152). The parent version (SCAS-P) consists of 38 items, formulated to correspond to the child version, and has shown high internal consistency (153). Quality of life was measured in study I and II using the Quality of Life Inventory – Child version (QOLI –C) (154,155). It covers ten child adjusted life domains that are rated on how important they are and how satisfied the participant is with them. Client Satisfaction Scale (CSS) was used to measure treatment satisfaction in children and parents at post-treatment in study I and II (156).

#### 3.2.2.1 Screening measures

In studies I-III, the web-based version of the Development and Well-Being Assessment interview (DAWBA) was used to screen for common mental health disorders such as anxiety disorders, depression, ADHD, ASD and bipolar disorder (54). The Children's Depression Inventory was used to assess child depressive symptoms at baseline (157). The Hospital Anxiety and Depression Scale (HADS) and the Primary Care Evaluation of Mental disorders was used to assess parents' symptoms of anxiety, depression and other psychiatric problems at baseline (158-160).

## 3.3 STUDY I

### 3.3.1 Method

In this study, 30 families with a child (8-12 years of age) with a principal diagnosis of specific phobia were recruited through media advertisement in local newspapers in Stockholm. We did not include children with a principal blood, injury or injection phobia. All participants were offered six weeks of ICBT focusing on their principal SP. Outcome measures, except the ones already mentioned, included the Fear Survey Schedule for

Children-Revised (FSSC-R) (161,162). Participants were assessed at baseline, post-treatment and three-month follow-up.

### 3.3.2 Results

Only 50% of the families completed the first nine of eleven modules at the recommended pace, and there was no data on amount of exposures or other variables that fully captures treatment compliance adequately. At post-treatment, there were significant reductions on the primary outcome measure, the CSR, with a large within-group effect size (Cohen's $d$=1.0), and 33% of children no longer met diagnostic criteria for their principal SP. Self-report measures from parents and children showed significant improvements on anxiety symptoms, with small to moderate effect sizes. Effects were maintained at three-month follow-up, and proportion of participants free from their principal SP increased to 47%. No improvement could be seen on the QOLI-C. On the contrary, quality of life ratings were significantly lower at three-month follow-up compared to post-treatment. Treatment satisfaction was higher among children than parents and 67% of parents answered that they would recommend the treatment to a friend with similar problems.

### 3.3.3 Methodological considerations

This was a pilot study with the major limitation of being uncontrolled, meaning that the improvements found could also be explained by the passage of time. Furthermore, we were unable to use blind assessors for the follow-up interviews and it cannot be ruled out that interviewers were biased in their assessment. Moreover, follow-up interviews were conducted over the telephone with only a parent, in contrast to the baseline interview where both the child and parent interviews were conducted face-to-face.

## 3.4 STUDY II

### 3.4.1 Method

In this study, participants were families (N=93) with a child (8-12 years of age) with a principal anxiety disorder of generalized anxiety disorder, panic disorder, separation anxiety, social phobia or specific phobia. After completing baseline assessment, participants were randomized to ICBT or a waitlist control. Participants were assessed at baseline and post-treatment and the treatment group was also assessed at three-month follow-up. For ethical reasons, the waitlist were offered treatment after the post-assessment.

Some adjustments were made to the ICBT intervention for this study. First of all, five versions of the treatment program were created and each one was adapted, through psychoeducation and examples, to fit a specific anxiety disorder. Also, rationale and instructions for worry-time were included in the GAD version, and brief psychoeducation on social skills training was added to the social phobia version. Children received the treatment program corresponding to their principal anxiety disorder. Secondly, the treatment was extended to ten weeks. In addition to the measures mentioned above, this study included diagnosis specific measures for all principal anxiety disorders except panic disorder. The

FSSC-R was again administered to children with principal specific phobia, the child version of Penn State Worry Questionnaire (163) was used for children with GAD, and the Separation Anxiety Avoidance Inventory for Children (164) and Social Phobia and Anxiety Inventory (165) were used for children with principal diagnosis of SAD and SoP, respectively.

### 3.4.2 Results

In the ICBT group, 83% completed nine of the eleven modules within the treatment period, but as in study I there was no data on for example number of exposures. At post-treatment, there were significantly larger reductions on the CSR in the treatment group, compared to the waitlist control, with a large between-group effect size (Cohen's $d = 1.66$). Twenty per cent of children in the treatment group no longer met criteria for their principal diagnosis at post-treatment, compared to 7% in the waitlist group, and at follow-up this number had increased to 50%. Parent-reported child anxiety was significantly lower in the treatment group than in the waitlist group at post-treatment, with a small between-group effect size, but there were no significant differences between the groups regarding child-ratings of anxiety or quality of life at post-treatment. Child and parent versions of diagnosis specific measures did not reveal any significant group differences on pre- to post-treatment changes. Improvements between baseline and post-treatment were maintained at three-month follow-up. Treatment satisfaction was moderate and 86% of parents answered that they would recommend the treatment.

### 3.4.3 Methodological considerations

Although this study was controlled, the use of a waitlist, and not an active control, can be criticized. It cannot be ruled out that non-specific treatment effects such as therapist contact, treatment expectancy or focus on the child's anxiety could explain the improvement in the treatment group. Initially, there was an ambition to keep in touch weekly with the waitlist group through the treatment platform, but participants allocated to waitlist group did not login to the platform and it was not considered wise to tire the parents by trying to get them to log in when they were not offered anything. For ethical reasons, the waitlist group was offered ICBT after the post-treatment assessment and thus, the results at three-month follow-up are uncontrolled. As in study I, all follow-up interviews were "unblind" and based only on parent report.

### 3.5 STUDY III

### 3.5.1 Method

The sample in this study consisted of eighty-four children (8-12 years old) with anxiety disorders, from both the treatment group and waitlist control (after it had crossed over to treatment) of study II. Participants were assessed at post-treatment and three and twelve months after treatment using the CSR, CGAS and SCAS-P. Missing data was handled by multiple imputation. Baseline measures of symptom severity, number of diagnoses, principal and comorbid diagnoses, child reported depressive symptoms, suspected ASD, and parental

psychopathology were investigated as potential predictors of treatment outcome. Treatment outcome was defined as CSR change scores from baseline to three-month follow-up and diagnostic status at three-month follow-up.

### 3.5.2 Results

Intention-to-treat (ITT) analyses showed that treatment gains on CSR of principal anxiety disorder, parent rated anxiety symptoms and global functioning, were maintained at three- and twelve-month follow-up, with mainly large effect sizes (within-group Cohen's $d = 0.63$–$2.35$). ITT analysis showed that 55% and 73% were free of their principal anxiety disorder at three- and twelve-month follow-up, respectively.

Completer analyses showed that suspected ASD was associated with smaller change scores between baseline and three-month follow-up, and that higher CSR baseline scores were associated with larger change scores. No variables significantly predicted diagnostic status at follow-up.

### 3.5.3 Methodological considerations

This study suffered from a substantial amount of missing data at three- and twelve-month follow-up and even though missing data was handled with recommended methods, it cannot be ruled out that results are biased. This study is restricted by the same limitations as study II, and, most importantly, the long-term follow-up is uncontrolled. Furthermore, the predictor analyses could be hampered by restriction of range, since the sample was quite homogenous, and data loss, as these analyses were based on observed data. The data on suspected ASD, which emerged as a predictor, was based on clinician interpretation of information from the DAWBA and not rated through a full structured ASD-assessment.

## 3.6 STUDY IV

### 3.6.1 Method

This was a survey study conducted at Swedish units of child and adolescent mental health services (CAMHS). First, Sweden's 21 counties were divided into five groups based on rurality or population density (population per square kilometer) and then three CAMHS-units were randomly chosen from each group. All mental health professionals at these units were offered to participate in a survey study about views on cCBT. The survey was a translated and slightly adapted version of the questionnaire "Clinicians' views about the use of cCBT with children and adolescents" used in the previously mentioned study by Stallard et al. (134). It contains both closed and open-ended questions about perceived advantages and drawbacks with cCBT, as well as some background information about the participant (profession, theoretical orientation, prior cCBT experience etc.). Regarding treatment orientation, clinicians identified themselves as oriented towards CBT, psychodynamic therapy, family therapy or other. A total number of 15 CAMHS-units participated and 156 surveys were collected from mental health professionals working at those units.

### 3.6.2 Results

Results showed that clinicians at Swedish CAMHS-units had little knowledge or experience of cCBT. About three quarters of clinicians were positive to cCBT as a prevention program, and as treatment for mild to moderate problems. In general, they reported seeing more advantages than disadvantages with cCBT. However, clinicians were more cautious regarding cCBT for more severe mental health problems and a majority believed that cCBT should not be available without professional support. Having identified oneself as a CBT-therapist was significantly associated with, among other things, being more positive towards the helpfulness of cCBT, more willing to use cCBT if it were available and not regarding lack of therapist contact and therapeutic alliance as a large concern. A higher degree of rurality was significantly associated with seeing it as an advantage that cCBT could offer earlier treatment and increase availability in rural areas, but also with perceived effectiveness of cCBT compared to face-to-face CBT.

Thematic analyses showed that clinicians had concerns regarding for example lack of human support, including reduced clinical information and therapeutic meetings, and too much focus on the individual at expense of contextual and family factors. Perceived advantages were for example increased availability and that some children and adolescents may prefer communication through a computer to face-to-face interaction.

### 3.6.3 Methodological considerations

The main limitation of this study was the sample size, both with regard to participating CAMHS-units and number of participating clinicians. The sample was relatively small and generalizations should be made cautiously. Moreover, the psychometric properties of the questionnaire have not been evaluated, and the questionnaire itself had some limitations; it asked about the use of cCBT for children in general, i.e. children 7-17 years of age. It might have affected the results if the questionnaire had allowed different responses for different age groups. The questionnaire also asked about cCBT rather than ICBT specifically (ICBT was mentioned as a form of cCBT) but as neither of the methods is widely spread or well known it is not likely that this has greatly influenced the results. Another limitation is that the qualitative analysis was conducted without the support of an experienced qualitative researcher. Although the qualitative part of this mixed methods study was small, it is possible that those results are biased.

Finally, depending on where ICBT is to be implemented, the participants in this study might not at all be representative with regard to prerequisites for implementation. Many CAMHS-units in Sweden see only the most complex and severe psychiatric patients and it is possible that ICBT will be more suitable for implementation within schools or primary health care, in which case the results of this study will not be as relevant.

# 4 GENERAL DISCUSSION

The overall aim of this thesis was to develop and evaluate internet-delivered CBT for children (8-12 years of age) with anxiety disorders, and to investigate prerequisites for implementation of ICBT for children within public health care.

## 4.1 THE EFFICACY OF THE ICBT PROGRAM

On most measures, such as clinician rated symptom severity, global functioning and parent rated anxiety symptoms, participants who received ICBT improved significantly between pre-treatment and post-treatment, and showed continued improvement at three-month-follow-up. In study II, these improvements were significantly larger than those seen in the waitlist comparison group. However, in comparison to face-to-face CBT for children with anxiety disorders, the proportion of responders (diagnostic status) in study I-III was relatively small at post-treatment (20-33%). At three-month follow-up in studies I-III, the proportion of participants free from their principal diagnosis in the ICBT group (47-55%) was more comparable to what is generally seen in face-to-face-studies at post-treatment (60%) (67). Thus, there seems to be a delay in the effect of ICBT. Moreover, it is important to remember that some studies on face-to-face CBT look at the presence of *any*, not just principal, anxiety disorder when reporting diagnostic status (67,166), suggesting an even larger improvement than in the present thesis. Even so, long-term follow-up in study III suggests that treatment gains are maintained and that some children continue to improve up to a year after ICBT. Although effects at follow-up are uncontrolled and hampered by data loss, and thus need to be interpreted somewhat cautiously, results are promising that ICBT can reduce anxiety symptoms and anxiety related impairment.

The limited literature on other ICBT and cCBT trials for children and youth with anxiety disorders show similar, although somewhat larger, outcomes. In these studies, all treatment groups show significant and large effects on the CSR compared to waitlist control, and the proportion of participants free of their primary diagnosis ranges from 30-81% and 26-75% at post-treatment and follow-up, respectively (115,116,118,120). Removing Khanna and Kendall's evaluation of computer-assisted CBT, which included several therapist-led exposure sessions, changes the range of proportions at post-treatment to 30-41%, which is still somewhat larger than in the present thesis.

Study I was an open trial that tested the feasibility of both the treatment and the technical platform. In this study, only children with specific phobia were included and the treatment period was shorter. Therefore, results cannot automatically be generalized to children with anxiety disorders in general. However, in light of the results in study II-III, it adds on to the general picture of a positive but delayed effect in treatment outcome. Why, one could ask, would you even consider a 10 week treatment for specific phobia when there is such good support for OST (68)? Firstly, not all CAMHS-units offer treatment, even OST, for specific phobia. Secondly, one-session treatment often consists of more than one session (167), where psychoeducation and treatment rationale is explained. The ICBT program includes a broader

psychoeducation, including instructions on how to perform exposure exercises. Thirdly, as ICBT is a form of self-help, it is uncertain if parents could be educated on how to conduct OST and then carry it out successfully with their children after just one internet-session. The additional length of ICBT compared to OST can also be seen as a strength and an investment for the future. Since the families work so much on their own and are obliged to take a lot of responsibility for the changes they make, they will hopefully be well equipped to deal with comorbid anxiety not targeted in the treatment or similar problems in the future. On the other hand, since results were roughly similar in study I and II, even though study I included only six weeks of treatment, it is possible that ICBT for specific phobia could be shortened.

We did not find any significant difference between the treatment and waitlist group on the child ratings of anxiety symptoms at post-treatment in study II, with both groups improving from pre- to post-treatment. Other ICBT and cCBT studies have also failed to find significant between-group effects on child ratings of anxiety symptoms at post-treatment (115,116,118), and it does not seem uncommon that children in waitlist groups report improvement even in face-to-face studies (168). Some possible explanations for this phenomenon have been suggested; for example low concordance between parent and children report, low test-retest reliability in young children, and that children could be downplaying their symptoms due to social desirability or expectancy (168). Perhaps children's levels of anxiety should be measured differently, for example with behavioral tests rather than self-report (169). On the other hand, a recent meta-analysis on CBT for children with anxiety disorders found large effects on (mostly) child-rated measures of anxiety symptoms (67), indicating that child-report measures are capable of capturing treatment effects. Therefore, it cannot be ruled out that there are other reasons for not finding larger effects on child-rated anxiety in the treatment group compared to the waitlist.

Of more concern than not finding any effects on child-rated anxiety is the fact that we, in both studies I and II, found a decrease in the quality of life measure in the intervention group. QOLI-C has, to the best of my knowledge, not been used in many outcome studies and it is therefore difficult to know what to expect. In a study of Öst et al., QOLI scores improved in the intervention group but not in the waitlist group (170), indicating that the measure in itself can be suitable for intervention studies. As results in studies I and II generally point towards improvement it is hard to understand why quality of life (QoL) would decrease. It would be more understandable if QoL simply did not increase, since the measure contains a wide range of life domains that may not have been affected by the anxiety in the first place. On the other hand, it could be that the demands of treatment temporarily interfere with other areas of life, and that improvement in QoL may not be apparent until long-term follow-up. In any case, this highlights the importance of explicitly investigating negative effects or adverse events following ICBT for children in future studies.

Surprisingly, we did not find any significant between-group effects on the diagnosis specific measures in study II. For social phobia this could be explained by lack of power since there were very few children presenting with social phobia as principal diagnosis, but for the other

measures one would have expected at least small effects. It is troublesome that FSSC-R-C saw an increase in symptoms at post-treatment in study II, when it showed moderate improvement in study I. However, all diagnosis specific measures in the treatment group, including FSSC-R-C, showed a decrease at three-month follow-up compared to post-treatment scores, and it could be connected to the delay in effect already mentioned. There was a large amount of missing data on the diagnosis specific measures and results must be interpreted cautiously.

Treatment satisfaction was measured in studies I and II and although it was not the main outcome it is an important aspect of the results. The scale we used to measure treatment satisfaction included several items covering participants' views on treatment outcome. Therefore, it is not surprising that satisfaction ratings in studies I and II were moderate. However, a majority (67% and 86%) answered that they would recommend the treatment to someone else, indicating that most families found the treatment acceptable. Although I mainly discuss the attitudes of clinicians as a prerequisite for implementation in this thesis, the opinions of the families who have participated in treatment will also be of great importance if ICBT is to become an option within regular health care. Future studies should continue to investigate participants' satisfaction, as well as their suggestions for improvement, in order to continuously better the ICBT program.

In summary, although research is scarce on ICBT for children with anxiety disorders, results are promising, especially if one draws support from cCBT and bibliotherapy studies, which similarly show promising results (68). Therapist-supported self-help interventions have been shown to be a feasible option for children and there is no apparent reason why ICBT in general should not prove to not be equally effective, although improvements could be made to this specific ICBT program.

### 4.1.1   For whom is the ICBT program effective?

Results indicate that there are a proportion of children who will benefit from ICBT, and thus will not require seeing a therapist face-to-face for additional assessment or treatment. For some children, however, ICBT will not be sufficient. The predictor analyses in study III found few predictors of treatment outcome. One predictor that did emerge was suspected ASD, which was associated with smaller change scores between pre-treatment and three-month follow-up, but not with diagnostic status at follow-up. Children with ASD did improve on CSR scores, but their changes were more modest and they seemed to not improve between post-treatment and follow-up to the same extent as the rest of the group. The treatment program in this thesis was not designed specifically for children with ASD and it is likely that ICBT programs targeting these children will need some adaption, just as face-to-face CBT has been adapted to better fit this group (e.g. 171,172).

Higher baseline CSR scores also predicted higher change scores between post-treatment and follow-up. This is not surprising as higher scores at baseline leaves more room for improvement. No other significant predictors were found, but this does not mean that there

are no predictors. There may be other important predictors that we did not measure or analyze, or it could be that the sample in study III was to homogenous for predictors to emerge. If the sample in the studies were to be deemed representative for the group for whom ICBT is most likely to be offered in the future, we would have to conclude that we have not yet identified the relevant predictors. The therapists in the studies believe that treatment compliance is one of the most important determinants of treatment effect, and have noticed that factors such as parental motivation, planning skills, perceived lack of time, or poor communication between divorced parents seem to be associated with compliance. These factors, and their relation to treatment outcome, will be interesting to investigate further in future studies.

Although parental psychopathology, measured with HADS, did not emerge as predictor of treatment outcome in study III it would be interesting to examine it more closely in future studies. Breinholst et al. suggested that parental involvement in child CBT might be more effective if the parents had anxiety disorders of their own (78). Since parents are highly involved in understanding the rational for treatment and responsible for planning and conducting exposures, it is possible that they may also benefit from treatment, even though their problems are not directly targeted. The relationship between parental psychopathology, treatment compliance and outcome would also be an interesting question to address.

## 4.1.2  Specific aspects of the ICBT program

Due to lack of resources and infrastructure, data on for example therapist time and number and length of phone calls were not collected. It is also unfortunate that these studies do not have valid data on treatment compliance. Although number of completed modules is reported, these do not accurately represent how much the families actually practiced the strategies presented in the program. Furthermore, during the weeks that families were instructed to work independently and report their progress very few families actually logged in to the platform, resulting in the therapists losing track of participants and not knowing if they were active or not. Although not documented in quantitative data, the experience of the therapists was that the families understood the concepts but may not have practiced as much as was intended. Reasons for this were mainly reported as trouble finding time, and other everyday activities (e.g. work, homework, athletic practice, birthdays and vacations) coming in the way. Similar results were found by McLoone et al., where parents reported having a hard time finding time to do a bibliotherapy program, and where participants who perceived treatment demands as problematic also completed fewer sessions (173). It is interesting that, in face-to-face CBT, it has been found that homework compliance does not predict treatment outcome in children and adolescents (94,95). However, the role of homework in face-to-face CBT is quite different from in ICBT, where "homework" is the only context for trying out and practicing new skills, and these findings may not be applicable to ICBT. To better understand the mechanisms of ICBT, it will be important to find new and improved ways of measuring treatment compliance.

The treatment program in studies I-III focuses mainly on exposure and has not previously been tested in a face-to-face setting. Thus, we cannot be sure to what extent the results reflect the content as opposed to the fact that it was internet-delivered. As previously mentioned, there seems to be a widespread belief that exposure is the most important component in the treatment of pediatric anxiety, despite the fact that there are very few studies explicitly investigating the role of exposure (47,81,82). Child CBT traditionally includes a large range of components (76) and there is little evidence speaking for or against any one component. It is not yet established that exposure is the most important factor of CBT for pediatric anxiety, or that it is effective without the anxiety management strategies that traditionally accompany it. Perhaps the fact that treatment compliance was low, and that the studies yielded smaller effects compared to other CBT programs, could be connected to the strong emphasis on exposure.

Another aspect of this newly developed treatment is how it should be described; is it transdiagnostic or disorder specific? Although the five treatment programs were too similar and not distinct enough to be considered disorder specific, they were separate from each other, and examples and suggestions for exposure were provided on the basis of the child's principal anxiety disorder. Is it then fair to present the results in terms of anxiety disorders in general, without breaking it down into the different diagnoses? I believe that the disorder specific adaptations in this study do not exceed adaptations that may have been done in individual face-to-face CBT for child anxiety disorders. Thus, presenting results as if from one transdiagnostic program is not entirely unreasonable. Despite the focus on the principal diagnosis, Study III showed that a proportion of children no longer fulfilled criteria for any anxiety disorder at follow-up, suggesting that, although disorder specific, the treatment may have positive effects on comorbid disorders. However, given the limitations of this study, this should be interpreted with caution.

As previously mentioned, Manassis and colleagues found that parent involvement focusing on contingency management and transfer of control were associated with greater improvements at long-term follow-up compared to other types of parent involvement (79). They suggested that these components may increase parents' abilities to coach their child in the use of CBT strategies and thus be most important for treatment success. Although the focus on the role of the parent is limited in the ICBT program, these two aspects of parental involvement, especially transfer of control, are very much in focus and this could be seen as a strength of guided self-help. On the other hand, given the research suggesting a complex relationship between parent behaviors and child anxiety (26,27), it could be a drawback that the ICBT therapist has limited information about the interaction between parents and children. In future studies, it would be interesting to explore how specific parent behaviors are associated with treatment outcome.

### 4.1.3  Changes to the ICBT program

Conducting studies I-III has been extremely educational. Our experiences from studies I and II have resulted in a revised version of the ICBT program. First of all, the revised ICBT

program follows a "once a week" format in order to keep better track of the participants and ensure that they report their efforts and progress. Secondly, we have created separate child and parent modules throughout the treatment in order to coach parents to do more practical planning of homework assignments without boring the child, enabling parents to discuss treatment issues freely with their psychologist, and educating parents on behaviors that might contribute to the maintaining the child's anxiety. Thirdly, we have placed a larger emphasis on the diagnosis specific features in the different modules. This revised treatment program is currently being evaluated compared to an active control group and we expect to have a higher degree of treatment compliance than in the studies in the present thesis.

In addition to having learned a lot about the delivering CBT over the internet, and about the practicalities of running a clinical trial on ICBT, we now also have the resources and infrastructure to manage a more active control group, logging of therapist time and participant activity, a more reliable system for data collection to minimize data loss, and the use of blind assessors.

## 4.2  BARRIERS TO IMPLEMENTATION

Study IV showed, in line with previous research (134,137), that clinicians, despite not having any particular knowledge of cCBT, were positive towards using it for mild to moderate problems and that a majority would consider using cCBT in certain settings. Looking at the literature on barriers for implementation it is apparent that both attitudes and knowledge can play an important part in the success of the implementation of an intervention. Even though study IV indicated mainly positive attitudes there are still things that could be done to increase the likelihood of successful implementation. Importantly, clinicians' knowledge about ICBT could be increased.

First of all, we need to inform clinicians about the narrow reach of CBT today and the potential advantages of ICBT in order to create a sense of urgency regarding development of methods that will increase availability to treatment (126,127). Secondly, explicitly addressing the fears and misgivings of clinicians by providing information on predictors of improvement will hopefully increase the likelihood of implementation. Thirdly, our study showed that only a small proportion of clinicians claimed to have previous knowledge or experience of ICBT. Other studies have reported that clinicians demand training and practical information before considering using ICBT (135,137,138), and that innovations are more easily adopted if clinicians can try them out and experiment with them beforehand (126). Therefore, it will be important to provide clinicians with practical information about ICBT, as well as training in how ICBT is conducted. Furthermore, it has been found that innovations that have a clear, unambiguous advantage in either effectiveness or cost-effectiveness are more easily adopted and implemented (126), and this highlights the importance of conducting more sophisticated outcome studies. As previously mentioned, we are currently conducting a study of the revised ICBT program where we are using blind assessors, with a more rigorous training of assessors, a more active control group and a higher proportion of clinically referred patients. Spreading

information from our studies, as well as ICBT studies conducted by other research groups, will probably be important before attempting dissemination.

Certainly, there are many individual and organizational factors that need to be taken into account in implementation processes (131), and the issues covered here are only part of them. Still, they have been identified in previous research as important factors and it is critical that we do not forget them in our desire to disseminate our newly developed methods. Although it is not for our project to decide how ICBT for children with anxiety disorders should ultimately be implemented within public health care I will allow myself to discuss this briefly.

### 4.2.1  Future implementation issues

Although the question of implementation might seem premature, our thoughts about it will influence the design of future studies. Should future research focus on a stepped care approach? Or on blended ICBT (ICBT with face-to-face components)? Should we conduct research within specialized child psychiatry or primary health care? Perhaps we should conduct a non-inferiority trial to test the efficacy of ICBT compared to face-to-face treatment? Or compare self- vs. therapist-guided programs? Although the adult literature has shown that therapist-led programs are often more effective than self-guided programs (174,175), some studies have shown that coaches with less clinical training than clinical psychologists can be effective therapists (176,177), opening up for even more implementation alternatives. Implementation strategies should not only consider the quickest way of making ICBT available, but also to which patients ICBT should be offered, and thus, in what context it should be evaluated and provided.

We are currently conducting a small pilot study at a publicly funded CAMHS-unit in a rural area of Sweden where a handful of interested therapists are responsible for recruitment of participants, assessment, treatment and follow-up, under supervision of our research team. Is this a feasible model for future implementation – that every CAMHS-unit or county council has its own ICBT team? Or would it be more beneficial with a national ICBT center serving the whole country? A national competence center and clinic could contribute to the continuous development, improvement and evaluation of ICBT, while providing education and supervision to others interested in ICBT. However, it would still require therapists in local CAMHS-units being aware of ICBT and being sufficiently positive to refer patients. Study IV and previous studies suggest that CBT-therapists will be more positive towards ICBT (126,140), and this may be valuable knowledge and could provide a foundation to build on in future dissemination strategies.

Shafran et al. have pointed out the importance of supervision and of allowing treatment protocols to be locally modified if implementation of evidence-based methods is to be successful (99). Similarly, Greenhalgh and colleagues found that adoption was more likely if the organizational structures and systems required around a new innovation were adaptable (126). Thus, collaboration between researchers, clinicians, managers and commisioners

tailoring different solutions to specific contexts, will probably be crucial if implementation and dissemination of ICBT for children is to be successful.

## 4.3 LIMITATIONS

As previously mentioned, there are some major limitations that must be considered when interpreting the results of the clinical trials. These include the use of a waitlist control in study II, no control group in study I, a large amount of data loss in studies II and III, especially at long-term follow-up and on self-report measures, and "unblind" interviews with only parents at post-treatment and follow-up.

Regarding the decision to use telephone interviews with only parents at all post and follow-up assessments in studies I-III, it was not considered feasible to conduct telephone interviews (some of them quite lengthy as all diagnoses that were present at baseline were to be followed up) with the younger children, and we did not have the resources or infrastructure to conduct live interviews. We therefore chose to only interview the parents and to use the same method with all families, regardless of the child's age or number of diagnoses. Previous research also indicates that parent information contributes more to assigning the final diagnoses, especially with children younger than ten years of age, and that there is good agreement between diagnoses based only on parents compared to those based on parent and child report (57,62,150). Our own analyses of inter-rater reliability from study II also showed that CSR ratings based on parent interviews were more similar to the composite score than the child based ratings. Thus, it is reasonable to believe that results would not be greatly different if the children had been interviewed.

Another potential limitation is the representativeness of the sample. Are the families who participated in studies I and II representative of a clinical population? In studies I-II, about 35% of families reported having had previous contact with a CAMHS-unit or a psychologist. All participants were self-referred, and a high proportion of the parents were highly educated (60-70% in studies I and II, compared to 41% and 50% in Sweden and Stockholm, respectively (178)). Looking at anxiety symptoms, the sample in study II had slightly lower scores on CSR and SCAS-P compared to other studies (48,115,116,120).

On the other hand, it is important to remember that ICBT is not being proposed as an alternative treatment to everyone, but as a way of increasing general availability, and that ICBT should be offered to those who are likely to benefit from treatment rather than to any and every child presenting with anxiety problems regardless of context or comorbidity. ICBT could, for example, be offered as an intervention within primary health care rather than within specialized psychiatry. The largest benefits of ICBT will, in my opinion, most likely be the possibility to offer treatment to those who would otherwise not have received CBT at all, as well as being able to offer treatment earlier. Very likely, the group that we have recruited to our studies, who might have become patients within specialized child psychiatry within a couple of years, is similar to the group that will turn out to be most suitable for

ICBT. In that way, the sample in these studies may be relevant for the population that it will probably be offered to in the future.

## 4.4  ETHICAL CONSIDERATIONS

All studies in this thesis were approved by the Regional Ethics Committee in Stockholm, and no major risks or adverse events were expected to befall the participants in studies I-III. One of the concerns raised by the clinicians in study IV was the reduced amount of clinical information available to the therapist during ICBT. It is true that ICBT therapists are dependent on what information the families chose or are able to communicate in writing. One way to deal with this concern is to conduct thorough assessments before treatment. Also, the possibility for families to contact the therapist at any time through the platform, together with the use of structured symptom monitoring during treatment, will hopefully provide clinicians with sufficient information, at least as long as the families log in to the platform.

In my opinion, the greatest risk that these participants were exposed to was the risk of ICBT not being helpful for them and thus keeping them from other treatment options. On the other hand, this was the first help-seeking step for a majority of the families and it may well be that they would not have sought other treatment, had they not participated in the studies. Since ICBT is a new treatment method that differs from traditional face-to-face CBT in some important aspects, the risk of families thinking: "CBT is not for me" after an unsuccessful ICBT treatment, is probably quite small (although this could change if ICBT were to receive a lot of positive attention). These aspects are, I believe, among the most relevant when considering implementation and dissemination of ICBT within public health care. It highlights the need of continued research on predictors of treatment response and the importance of continuously improving our assessment methods.

# 5  CONCLUSIONS

Although these studies have several limitations, they show promising support for the effectiveness of ICBT for at least a subset of children with anxiety disorders. Results suggest that ICBT is better than receiving no treatment but there is still room for improvement. Results also show that most clinicians within Swedish CAMHS-units would consider using ICBT for some children and families. Given the proportion of children suffering from anxiety disorders, and the risks associated with anxiety, it seems probable that a broad implementation of ICBT to children with mild to moderate anxiety would be acceptable to clinicians. How to increase the proportion of children who will benefit from ICBT and in what manner ICBT will be most successfully implemented will be important issues for future research.

# 6 ACKNOWLEDGEMENTS

experienced a meaningful change after going through our programs. If this thesis would amount to nothing else, that would still make it all worthwhile.

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