Adolescent social anxiety:

Testing aspects of the cognitive model and

developing an internet version of cognitive therapy.



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ABSTRACT

Social anxiety disorder is a common anxiety disorder that can markedly interfere with life and is particularly persistent in the absence of treatment. Outcomes for the treatment of adults with social anxiety disorder have improved considerably in the last twenty years, particularly due to the development of psychological therapies designed to target specific cognitive and behavioural processes that maintain the disorder. Internet versions of the therapies that have been developed also hold the promise of being able to greatly increase the availability of effective therapy in adults.

The overarching aim of the thesis is to improve our understanding of the cognitive and behavioural maintenance mechanisms of adolescent social anxiety and to develop an effective and scalable intervention for the disorder in youth. My first study is a systematic review of empirical research examining the Clark & Wells (1995) cognitive model of social anxiety in adolescents. My second and third studies adopt experimental methods to test key hypotheses of the model in adolescents. The fourth and fifth studies are concerned with improving measurement of social anxiety symptoms and related cognitions to aid research and clinical activities. The sixth and final study is a randomised waitlist-controlled trial of internet-delivered cognitive therapy for social anxiety disorder in adolescents. Adopting a strategy of closely interweaving clinical and experimental studies, the thesis provides support for: (1) the applicability of the cognitive model of Clark & Wells (1995) to adolescents; (2) self-report measures of social anxiety symptoms and related cognitions; and (3) internet-delivered cognitive therapy for the treatment of adolescent social anxiety disorder.

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CHAPTER 1. GENERAL INTRODUCTION

Social anxiety disorder (SAD) is common, disabling, and persistent in the absence of treatment (Wittchen, Stein, & Kessler, 1999). Most cases have their onset in early adolescence (Beesdo-Baum et al., 2012), but unfortunately the most widely available psychological treatments for the disorder in youth are not very effective (Evans, Clark, & Leigh, 2021). The principal aim of the present thesis is therefore to improve our understanding of the cognitive and behavioural maintenance mechanisms of adolescent social anxiety and to improve treatment outcomes for this population.

Here in Chapter 1, I provide an introduction to social anxiety disorder (SAD) and then a discussion focusing on three areas: the cognitive and behavioural processes that maintain social anxiety in adults and adolescents; the development of effective and accessible treatment for adolescent SAD; and the importance of valid and reliable measures of social anxiety symptoms and central maintenance processes to facilitate this.

The thesis is concerned with adolescence. The World Health Organisation (WHO, 2020) suggests that adolescence spans the age range from 11 to 19 years. More recently, the Department of Health and Social Care in England has tended to talk about the age range 11 to 25 years. For this thesis I have focused on young people aged 11 to 18 years. This is because 18 is the upper age that appears in UK school samples, and it seemed appropriate to map onto the secondary school phase. In the thesis the terms ‘young people’ and ‘adolescent’ and ‘youth’ are all used to refer to individuals between 11 and 18 years of age.

1.1. Characteristics and Consequences of Social Anxiety Disorder

SAD is a debilitating condition characterised by a marked and persistent fear of being humiliated or scrutinised by others (American Psychiatric Association, 2013; World Health Organization, 1992). Individuals fear a range of social interactions, such as conversations with strangers, joining in groups or speaking on the telephone. Many of the activities that involve being observed by others can be difficult. These include walking into a room when other people are already seated, eating and drinking in public, and performing in front of an audience. Individuals fear that they will say or do something that they believe will be humiliating or embarrassing. Common concerns include the fear of sweating, shaking, blushing, stumbling over words, looking anxious, or appearing boring, stupid, or incompetent (Stein & Stein, 2008).

SAD is the third most common mental health disorder after depression and substance abuse and the most common anxiety disorder (Sareen & Stein, 2000). In the USA, lifetime prevalence rates of 12% have been reported, compared with lifetime prevalence rates of 6% for generalised anxiety disorder (GAD) and 5% for panic disorder (Kessler et al., 2005). Population rates have been examined in a number of countries, with most studies carried out in western European countries, the US and Australia. A median lifetime prevalence rate of 6.4% was reported in a review of European studies (Fehm, Pelissolo, Furmark, & Wittchen, 2005). A cross-national study across a range of low, middle, and high income countries estimated a lifetime prevalence rate of 4% across all countries, with evidence of lower rates in low/lower-middle income countries and in the African and Eastern Mediterranean regions, and higher rates in high income countries and in the Americas and the Western Pacific region (Stein et al., 2017).

It is common in young people. Prevalence rates of around 10% have been reported by the end of adolescence in US and New Zealand samples (Burstein et al., 2011;

Merikangas et al., 2010; Feehan, McGee, Raja, & Williams, 1994). Studies of the period prevalence of the disorder in young people aged between 11 and 17 years have estimated prevalence between 0.7 and 11.1% (Beesdo, Knappe, & Pine, 2009), with European studies (in Germany and Finland) identifying period prevalence rates between 1.4 and 3.2% (Ranta, Kaltiala-Heino, Rantanen, & Marttunen, 2009; Essau, Conradt, & Petermann, 2000; Wittchen, Stein, et al., 1999). The figures suggest that on average, one adolescent in every classroom may be affected by social anxiety disorder.

SAD has one of the lowest natural recovery rates of common mental health conditions (Bruce et al., 2005; Reich, Goldenberg, Goisman, Vasile, & Keller, 1994; Reich, Goldenberg, Vasile, Goisman, & Keller, 1994). For example, Bruce and colleagues (2005) reported findings of a US-based community study in which adults with various anxiety disorders were followed up for 12 years. At the start of the study, individuals had suffered with SAD for 19 years on average, and over the next 12 years only 37% recovered. This is compared with recovery rates of 58% for Generalised Anxiety Disorder and 82% for panic disorder without agoraphobia. Similar findings have been reported in adolescent samples. A 10-year prospective community study with over 3000 German adolescents and young adults (aged 14 - 24 years) (Beesdo-Baum et al., 2012) found that 57% of those with SAD at the start of the study were still reporting at least symptomatic social anxiety at follow up and higher persistence of social anxiety was significantly predicted by an earlier age of onset of the disorder. Only 15% were completely remitted.

SAD is associated with high levels of impairment across all areas of life. Social relationships are inevitably particularly challenging for socially anxious adolescents. In unselected samples of adolescents, social anxiety symptoms have been found to be associated with fewer close friends and reports of poorer quality peer and romantic relationships (Hebert, Fales, Nangle, Papadakis, & Grover, 2013; La Greca & Harrison,

2005). Furthermore, social anxiety symptoms are prospectively associated with increased peer victimisation in general adolescent samples (Acquah, Topalli, Wilson, Junttila, & Niemi, 2016; Ranta et al., 2009). Consistent with this, a recent systematic review and meta-analysis of 23 studies found evidence for a significant prospective two-way association between social anxiety symptoms and peer victimisation, peer rejection and friendship quality in adolescents (Chiu, Clark, & Leigh, 2021b). Because social interactions pervade many aspects of our lives, social anxiety often makes everyday tasks, such as shopping and using the telephone, a challenge. There is some evidence that academic attainment is curtailed. For example, in a population-based birth cohort study (Vilaplana-Pérez et al., 2020), compared to those without SAD, individuals with SAD were less likely to pass all subjects in the last year of compulsory education and less likely to finish upper secondary education, start a university degree, obtain a university degree, and finish postgraduate education. The findings remained when controlling for psychiatric comorbidities and genetic and shared familial factors.

Research with adults demonstrates that the impairments associated with SAD persist into adulthood. In terms of close relationships, adults with SAD are less likely to marry, more likely to divorce and less likely to have children (Wittchen, Fuetsch, Sonntag, Müller, & Liebowitz, 1999). Employment is affected: although the majority of adults with SAD are employed, they take more days off and report lower productivity due to their symptoms compared to those without SAD (Stein & Kean, 2000). A study amongst adults seeking treatment for SAD found that the functional impairment was not due to the presence of comorbid mood or anxiety disorders (Aderka et al., 2012).

1.2. Adolescence and the Development of SAD

Social anxiety is a disorder with its origins in adolescence; the majority of cases in adulthood have their onset during this period (Kessler et al., 2005). Prospective, longitudinal studies suggest that it is relatively unusual in early childhood (Wittchen, Stein, et al., 1999), with incidence increasing through the adolescent years and a median age of onset of 13 years (Kessler et al., 2005). After this peak period of onset, new cases are fairly rare after about the age of 25 years (Heimberg, Stein, Hiripi, & Kessler, 2000). The increased incidence of SAD during adolescence is perhaps unsurprising. Adolescence is a time when people are moving from a unique reliance on their family unit and are learning how to interact with peers in a way that will set them up for the rest of their life. They become increasingly autonomous from their parents and reliant instead upon their peer group (Larson & Richards, 1991).

Underpinning this social reorientation is the development of particular neurocognitive abilities (Kilford, Garrett, & Blakemore, 2016). One of these is self-consciousness. Self-consciousness is the directing of attention inwards, with both a private and public dimension (Davis & Franzoi, 1999). Private self-consciousness refers to an awareness of one's inner thoughts and feelings whilst public self-consciousness is an awareness of the self as a social object. Self-consciousness, and particularly the public aspect of it, is thought to peak in early adolescence (Cicchetti & Cohen, 2006; Rankin, Lane, Gibbons, & Gerrard, 2004; Vartanian, 2000). The development of public self-consciousness will enhance adolescents' sensitivity to how they are being perceived by others. This awareness will inform how adolescents behave towards other people and will help them to establish more mature and enduring relationships with their peers. However, it seems very plausible that an acute awareness of the self as a social object may also confer vulnerability for increased social anxiety and in line with this suggestion, public

self-consciousness has been found to be related to social anxiety in adolescents (Mallet & Rodriguez-Tomé, 1999) as well as in adults (Mor & Winquist, 2002). Although all young people seem to experience a normative increase in public self-consciousness in early adolescence, only a small proportion will develop persistent social anxiety, and so it is not in itself enough to explain the increased incidence. Rather, self-consciousness may be a necessary precursor implicated in the development and maintenance of social anxiety (Tillfors & Van Zalk, 2015). It seems plausible that the acute self-consciousness experienced during early adolescence renders this a developmentally sensitive period for the emergence of social anxiety (Haller, Cohen Kadosh, Scerif, & Lau, 2015)

As well as heightened self-consciousness, adolescence is also normally a period of strong sensitivity to peer influence, and it is a crucial phase of social learning. Social relationships are especially rewarding during adolescence and it has been suggested that this increases the impact of both positive and negative aspects of social interactions (Kilford et al., 2016). In line with this, studies consistently demonstrate that peer rejection leads to increased distress, anxiety, and lower mood in adolescents compared to children and adults (Platt, Kadosh, & Lau, 2013). The heightened emotional salience of peer interactions means adolescents are primed to prioritise the development of social networks but for some it will also bring about an increased vulnerability for the emergence and maintenance of social fears (Eldreth, Hardin, Pavletic, & Ernst, 2013).

In adulthood we pay attention to what others think but there is a certain resistance to peer influence. In contrast, during adolescence this resistance is far weaker, with young people showing a strong susceptibility to peer influence. This can present as conformism to trends. A study examining the effects of peer influence on risk taking in adolescents and peers bears this suggestion out (Gardner & Steinberg, 2005). When playing a driving-based video game, youths took significantly more risks when with peers than when alone,

whereas adult risk-taking behaviour was not affected by the presence of peers. Studies looking at resistance to peer influence are consistent with this finding (Andrews, Ahmed, & Blakemore, 2020). At the beginning of adolescence this resistance is low and only gradually increases to adult levels (Steinberg & Monahan, 2007). Susceptibility to peer influence in adolescence is likely to be adaptive, as it will provide the opportunity to form strong social bonds and learn vital lessons about relationships. However, it is also likely to represent a developmental sensitivity for the emergence of social fears.

As this brief discussion highlights, adolescence ushers in a host of changes at various levels including in neural circuitry, information processing, and the social environment (Blakemore, 2008). For the majority of adolescents, this manifests as a short-lived normative increase in social fears, which is not impairing and resolves spontaneously (Weems & Costa, 2005). For a subset of individuals, particularly those who are behaviourally inhibited by temperament (Clauss & Blackford, 2012) and therefore more liable to avoid social situations, it has been proposed that these neurodevelopmental changes are implicated in the development and maintenance of SAD (Caouette & Guyer, 2014).

The importance of understanding and intervening for young people with problematic SAD is clear given the low natural recovery rates and high associated impairment, but in addition to this, there may also be a more optimistic case for intervening early. It seems plausible that the neurodevelopmental changes associated with adolescence will enhance plasticity to the environment (Haller et al., 2015) and so it may be that adolescence offers a 'window of opportunity' in which to provide particularly potent interventions.

1.3. Psychological Treatments for Adolescent SAD

Traditionally, cognitive behavioural therapies (CBT) for young people did not target specific anxiety disorders. Instead, social, separation and generalized (or overanxious) anxiety disorders were all treated with the same set of techniques. Creswell, Waite, and Cooper (2014) suggest this approach was motivated by two principal factors. Firstly, the high comorbidity amongst the anxiety disorders in children and young people, and secondly, the lack of well-validated disorder-specific maintenance models. The most well-known examples of the 'generic' CBT approach are 'Coping Cat' for children (Kendall & Hedtke, 2006) and the 'CAT Project' for adolescents (Kendall, Choudhury, Hudson, & Webb, 2002). The treatments typically comprise 16 sessions and involve a combination of psychoeducation, anxiety management strategies, and graded exposure. There have been many randomized controlled trials (RCT) examining the effectiveness of Coping Cat and its various iterations for the treatment of adolescent anxiety (e.g. Ginsburg et al. (2011), Walkup et al. (2008)).

The efficacy of generic CBT for the treatment of anxiety disorders in young people has been supported by several reviews, with odds ratios for recovery of 3.3–7.85 following treatment compared with waitlist control (James, Reardon, Soler, James, & Creswell, 2020; Ewing, Monsen, Thompson, Cartwright-Hatton, & Field, 2015; Cartwright-Hatton, Roberts, Chitsabesan, Fothergill, & Harrington, 2004). However, historically the trials have reported remission or recovery rates from primary anxiety disorder and/or change on broad measures of anxiety symptoms, but they have not reported outcomes for different anxiety disorders. It has therefore been difficult to determine whether the type of primary anxiety problem moderates treatment response. More recently this question has been addressed, and it seems that youth with SAD may experience poorer treatment outcomes than those with the other anxiety disorders (Hudson, Rapee, et al., 2015; Hudson, Keers, et

al., 2015). For example, in a trial of 7-17 year olds treated with generic CBT, recovery among those with primary SAD was 40.6% compared to 72% among those with other anxiety disorders (Ginsburg et al., 2011). Consistent with this, a recent meta-analysis (Evans, Clark, et al., 2021) found that children and young people (aged 6-17 years) with primary SAD were 48% less likely to have recovered from this diagnosis post-treatment compared with those with other primary anxiety disorders (namely: separation anxiety disorder; generalised anxiety disorder; panic disorder; or agoraphobia).

As well as generic CBT, psychological therapies designed specifically for SAD have been developed. Cognitive behavioural group therapy (CBGT; Albano, Marten, Holt, Heimberg, and Barlow (1995) was one of the first to be tested. This treatment, adapted from adult Group CBT (Heimberg, Juster, Hope, & Mattia, 1995), involves social anxiety-related psychoeducation and skills training (social skills and anxiety management strategies) followed by exposure tasks (Albano & DiBartolo, 2007). In an early RCT, CBGT was compared to no treatment amongst female adolescents (n=35; average age = 15.8 years; Hayward et al. (2000)). The authors note that whilst those in the CBGT group showed significantly greater reductions in social anxiety symptoms compared to the no treatment group post-treatment, they continued to report considerable residual symptoms and at one-year follow-up the control group had also improved and there was no longer a significant group difference. Herbert et al. (2009) did not find evidence for specific treatment effects of CBGT in an RCT comparing the treatment to an educational supportive therapy amongst adolescents aged 12-17 years (n=73), with both treatments associated with an improvement in social anxiety symptoms, functioning and social skills.

Social Effectiveness Therapy for adults (SET; Turner, Beidel, Cooley, and Woody (1994)) and its parallel version for 8-12 year olds Social Effectiveness Therapy for Children and adolescents (SET-C, Beidel, Turner, and Morris (2000)) is another SAD

specific treatment. It is a behavioural group treatment comprising psychoeducation, social skills training, and exposure. In a pilot RCT with 12 adolescents (aged 13-18 years), SET-C outperformed waitlist on clinician- and self-reported symptoms (Baer & Garland, 2005). Olivares and colleagues (2002; 2002) compared SET-C and CBGT to a waitlist control in adolescents aged 15 to 17 years using a quasi-experimental design (participants were allocated to group according to their school timetables, random allocation was not used). Both active treatments yielded significantly better self- and clinician-rated improvements compared to waitlist with no differences between the two, and gains were maintained at five-year follow-up (Garcia-Lopez et al., 2006).

Masia-Warner and colleagues (2001) adapted SET-C for delivery in schools settings and they have tested the adapted treatment, Skills for Academic Success (SASS), in two RCTs. Compared to waitlist control, SASS led to significantly greater improvements in social anxiety, functioning and social skills based on self-, parent-, and clinician-report (Masia-Warner et al., 2005). Examining specific treatment effects, the authors compared SASS with an attention control which involved psycho-education and supportive therapy (Masia-Warner, Fisher, Shrout, Rathor, & Klein, 2007). Findings showed greater improvement in clinician- and self-, but not parent-, reports of social anxiety after SASS compared to the comparison, suggesting preliminary evidence for treatment specificity.

More recently, Spence and colleagues (Spence, Donovan, March, Kenardy, & Hearn, 2017) compared generic CBT to an adapted version of the treatment that included SAD specific techniques, such as social skills training (Beidel et al., 2007), and to waitlist in a group of 125 young people aged 8-17 years with primary SAD. Improvements were observed on continuous measures of symptom severity in both treatment arms compared to waitlist, but there were no significant differences between the two active conditions. There

was minimal effect of either intervention on diagnosis, with no significant differences across conditions: 12.8% in the generic CBT arm lost their diagnosis post-treatment, compared to 14.6% in the SAD-specific version, and 3.3% in the waitlist. The findings of the trial by Spence et al. (2017) suggests there is an ongoing need to enhance treatment outcomes for this population.

1.4. Improving Treatment Outcomes

In contrast to the limited evidence for treatment specificity in adolescents, substantial evidence for specific treatment effects has been observed in adults (Mayo-Wilson et al., 2014). The version of CBT for adults that has the most evidence for treatment specificity is a specialized form of individual cognitive therapy, developed to target the cognitive abnormalities and maintenance processes specified in the Clark and Wells (1995) model of SAD. Whilst there is overlap between this model and other cognitive behavioral models of social anxiety (Wong & Rapee, 2016) and the treatment has similarities to some other CBT approaches, many of the techniques are distinct. This can be seen in Table 1.1. which summarises what does and does not happen in cognitive therapy for SAD.

Table 1.1. Summary of what does and does not happen in cognitive therapy for social anxiety disorder

What happens in cognitive therapy
• Focuses on targets specified in Clark & Wells (1995) model. • **Personal version of model** • **Experiential exercise** *to demonstrate adverse effects of self-focused attention and safety behaviours* • **Video (and still) feedback** *to correct negative self-images* • **Attention training** *to promote external focus* • **Behavioural experiments** *to test patients' fearful predictions in social situations while* ***dropping safety behaviours*** *and/or* ***enacting feared outcomes***. • **Surveys** *to discover other people's view of feared outcomes*.

• **Memory work** (discrimination training and memory rescripting) *to reduce impact of early social trauma.*
What does **not** happen in cognitive therapy
• Repeated exposure to promote habituation • Exposure hierarchies • Rating anxiety in feared situations (SUDS) • Thought records • Rehearsal of rationale responses in social situations (self-instruction) • Social skills training

Cognitive therapy based on the Clark and Wells (1995) model has been compared to a number of other active treatments, and in the eight RCTs that have been undertaken (summarised in Table 1.2.) it has been shown to be superior to: Group CBT (Mörtberg, Clark, Sundin, & Åberg Wistedt, 2007; Stangier, Heidenreich, Peitz, Lauterbach, & Clark, 2003), exposure therapy (Clark et al., 2006), interpersonal psychotherapy (Stangier, Schramm, Heidenreich, Berger, & Clark, 2011), psychodynamic psychotherapy (Leichsenring et al., 2013), fluoxetine (Clark et al., 2003), paroxetine (Nordahl et al., 2016), medication-based treatment as usual (Yoshinaga et al., 2016; Mörtberg et al., 2007) and pill placebo (Clark et al., 2003). Cognitive therapy based on the Clark & Wells (1995) model is one of the two first-line treatments for adults recommended by the National Institute for Health and Care Excellence (NICE; 2013), an independent body that synthesizes available research evidence to develop treatment guidelines (the other recommended treatment being individual CBT based on the Heimberg model (1997)).

Such consistent and broad evidence for treatment specificity is unusual and suggests that it might be profitable to investigate whether the Clark and Wells' (1995) model applies to adolescent social anxiety as well as it does to the adult condition. If the model does apply to adolescents, then a treatment that rather single-mindedly focuses on the maintenance factors specified in the model may be helpful for this population. Certainly this type of approach, in which interventions are very tightly tied to known

maintenance factors, has proved successful as a strategy for developing effective forms of CBT for a range of anxiety-related conditions in adults (Clark, 2004).

Table 1.2. Summary of randomised controlled trials examining cognitive therapy for social anxiety disorder in adults.

Author/year	Country	Total sample size	% female	Comparison arms	Primary outcome measure	Post-treatment differences
Clark et al (2003)	UK	60	52%	Fluoxetine and self-exposure; Placebo and self-exposure	Social phobia composite*	CT > Fluoxetine and self-exposure = Placebo and self-exposure
Stangier et al (2003)	Germany	71	49%	Group CBT; Waitlist	SPAI	CT > Group CBT > Waitlist
Clark et al (2006)	UK	62	44%	Exposure and applied relaxation; Waitlist	Social phobia composite*	CT > Exposure and applied relaxation > Waitlist
Mortberg et al (2007)	Sweden	100	63%	Group CBT; Medication-based TAU	Social phobia composite*	CT > Group CBT = Medication-based TAU
Stangier et al (2011)	Germany	117	56%	Interpersonal Psychotherapy; Waitlist	CGI-I	CT > Interpersonal Psychotherapy > Waitlist
Leichsenring et al (2013)	Germany	495	54.6%	Psychodynamic psychotherapy; Waitlist	Remission based on LSAS	CT > Psychodynamic Psychotherapy > Waitlist
Nordahl et al (2016)	Norway	102	51%	Paroxetine and clinical management; Placebo and clinical management; CT and paroxetine	Fear of Negative Evaluation Questionnaire	CT = CT and paroxetine >Paroxetine and clinical management > Placebo and clinical management
Yoshinaga et al (2016)	Japan	42	41%	Medication-based TAU	Remission based on LSAS	CT > Medication-based TAU

NOTES: TAU = treatment as usual; LSAS = Liebowitz Social Anxiety Scale; SPAI = Social Phobia Anxiety Inventory; CGI-I = Clinical Global Impressions Scale. * The social phobia composite was created by averaging scores from five standardized self-report measures: the LSAS (Liebowitz, 1987); the Social Phobia Scale and the Social Interaction Anxiety Scale (Mattick & Clarke, 1998); the Fear Questionnaire Social Phobia sub-scale (Marks & Mathews, 1979); and the Fear of Negative Evaluation scale (Watson & Friend, 1969)

1.5. Cognitive Behavioural Models of Social Anxiety in Adults

Socially anxious individuals will face many social situations every day and the vast majority of these are benign, so why does social anxiety persist? A number of cognitive accounts have been put forward to try to explain this (Heimberg, Brozovich, & Rapee, 2010; Hofmann, 2007; Rapee & Heimberg, 1997; Clark & Wells, 1995) and there are commonalities amongst them, for example they all highlight the importance of fear of negative evaluation and of self-focused attention in maintaining social anxiety (see Wong and Rapee (2016) for a review).

According to the cognitive model developed by Clark and Wells (1995), people with social anxiety hold firm beliefs about the importance of making a good impression to others but they also believe they come across badly (Leary, 2001). Broad unconditional beliefs such as "*I am weird*" lead individuals to make assumptions about themselves and their social environment. These usually involve high self-expectations ("*I must always look cool and calm*") and conditional beliefs about their social behaviour ("*If I look at all anxious people will think I am a gibbering wreck*") (Wong & Moulds, 2011). These negative beliefs are activated in social settings and understandably trigger alarm (Hofmann, 2007). The sense of threat then motivates a chain of cognitive, affective, and behavioural responses. This chain of responses is self-perpetuating and closed off to new information. Several interlinked processes are emphasized in the model: a shift to an internal focus of attention and the use of internal information to infer how one appears to others (collectively described as a 'processing of the self as a social object'); safety behaviours; and worry and rumination that occur before and after the social event. These are described in more detail below and the model is displayed in Figure 1.1.

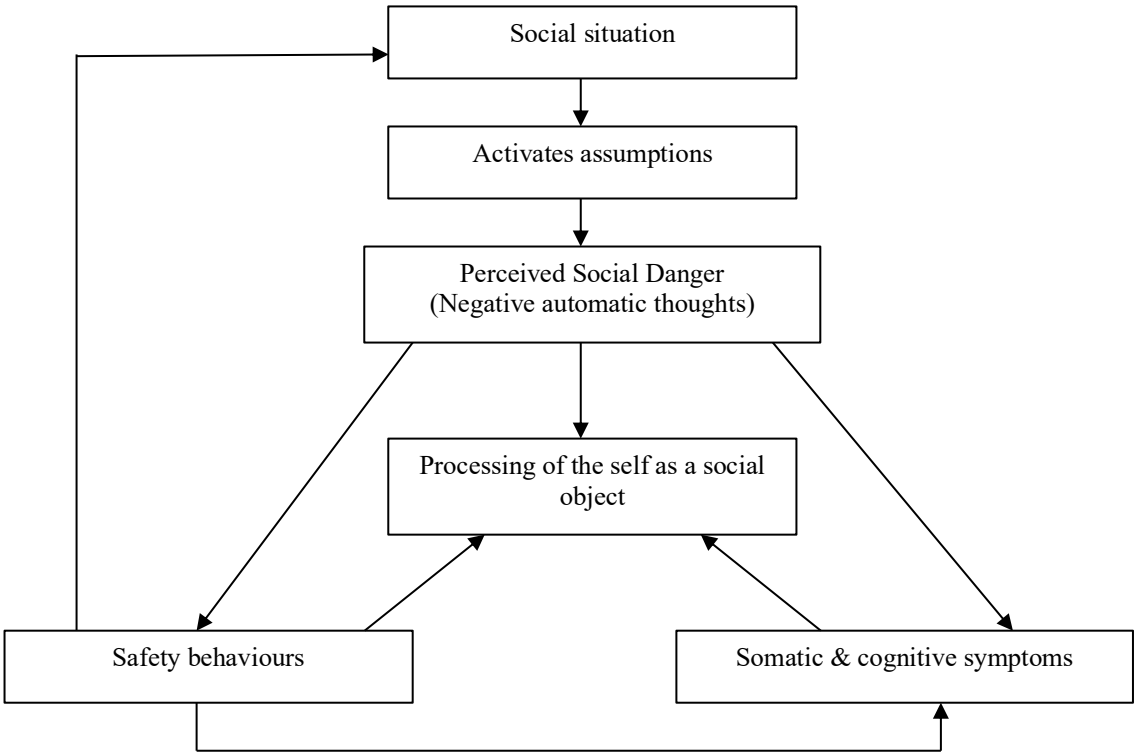


Figure 1.1. Cognitive model of social anxiety disorder (Clark & Wells, 1995).

First, the model suggests that when individuals enter a social situation their attention will shift to a predominantly internal focus, in order to closely monitor how they are coming across. One of the reasons that this self-focused attention is problematic is because it reduces the opportunity for the individual to process the social situation and other peoples' reactions. As a result, individuals often fail to observe that other people are responding to them in a broadly benign manner. Another consequence of the shift to an internal focus of attention is an increased awareness of internally generated information, such as feared sensations.

Second, the model proposes that individuals use internally generated information to create an impression of how they appear to other people. The information drawn upon includes feelings of anxiety and negative self-imagery. Individuals will often overestimate

how anxious they look, because they are assuming that they look as anxious as they feel (for example, "*I feel hot therefore I must be really red in the face*"). Negative images are common. Images usually come to mind from an observer perspective rather than a personal (or field) viewpoint and so it is natural that the images are assumed to be an accurate representation of how the individual looks to other people.

Third, the use of safety behaviours, which are motivated by the desire to prevent or minimize the consequences of feared outcomes (such as sounding stupid or blushing), further maintain social anxiety and negative social beliefs. Common safety behaviours in social anxiety include avoiding eye contact, preparing topics of conversation in advance, wearing lots of make-up, and agreeing with others. Safety behaviours are unhelpful for a number of reasons. They prevent the individual from discovering that the feared outcome was very unlikely to happen anyway. For example, "*the only reason no-one spotted me blushing was because I was wearing thick foundation*" (rather than because it was not particularly obvious to others anyway). Safety behaviours can heighten self-focus and monitoring, as an individual checks that the safety behaviours are 'working'. Safety behaviours can directly cause feared symptoms, for example, covering your cheeks to prevent blushing can make you hotter and cause flushing. Safety behaviours can make one appear withdrawn and unfriendly; behaviours such as avoiding eye contact or keeping conversations short can contaminate the social interaction and give the impression that one is not interested. Finally, safety behaviours can draw attention to feared behaviours, for example, speaking very quietly may cause others to lean in and pay especially close attention to hear what is being said.

Safety behaviours comprise a broad range of overt behaviours and mental operations. Some safety behaviours involve avoidance, such as speaking less and avoiding eye contact, whilst others are concerned with making a good impression, for example

checking you are coming across well and preparing topics in advance. Whilst it is suggested that both groups of safety behaviours are unhelpful as they prevent disconfirmation of negative beliefs and increase anxiety, only avoidance behaviours contaminate the social situation by making the individual appear withdrawn and unfriendly. Three studies have provided support for the distinction between avoidance and impression management safety behaviours. Plasencia, Alden, and Taylor (2011) conducted a factor analysis of data from the Social Behaviour Questionnaire which confirmed the existence of the two factors. In addition, correlational analyses indicated that both sets of safety behaviour appear to maintain social anxiety but only the avoidance behaviours had a negative effect on other people. In an earlier study, Hirsch, Meynen, and Clark (2004) examined correlations between subsets of items of the Social Behaviour Questionnaire and a questionnaire measuring the quality of a conversation as rated by the conversation partner. They found that items assessing avoidance behaviours was significantly correlated with negative ratings of the conversation, whilst items assessing impression management behaviours was not. Extending these correlational studies, a recent experimental study (Gray, Beierl, & Clark, 2019) directly manipulated the use of safety behaviours during a conversation task. The pattern of results was as expected, with use of both safety behaviour types increasing anxiety but only avoidance behaviours resulting in a negative response from the conversation partner.

Further unhelpful processes include anticipatory worry and post-event processing. Before a social event, individuals with social anxiety will review what they think is going to happen in detail. Negative predictions will prevail and are associated with anxiety and a host of memories of past failures and negative self-images. This worry is often enough to stop someone entering a social situation in the first place. If they do manage to go, they will be cued up to interpret social failings. Despite some brief relief on leaving a social

situation, socially anxious individuals often describe a continued cycle of negative thoughts and distress. Due to the inherently ambiguous nature of most social situations, it is rare that people receive an unquestionable seal of social approval. This ambiguity will usually equate to doubt for the socially anxious individual and in turn will initiate a 'post-mortem'. Post-mortems involve detailed revisiting of the previous event. However, because attention is trained internally during social events, and the focus is on negative thoughts, feelings and images, it is this that is reviewed in detail (especially the most distressing moments), rather than the objective facts of the event. As a result, the event will most likely be labeled a failure. Intense humiliation and shame commonly run alongside these ruminative thoughts. The post-mortem process can continue for days and sometimes weeks after an event.

I suggest that the cognitive model of Clark and Wells (1995) has the potential to be a good fit for an adolescent population. For example, self-focused attention is emphasized in this model and it is a construct that has clear parallels with self-consciousness (Stein, 2015) which is heightened during adolescence. Likewise, the concept of safety behaviours, which is emphasised in the model, may be pertinent to a teenage population. Avoidant safety behaviours may elicit particularly negative responses amongst adolescent peers, who as a group are especially sensitive to perceived peer rejection compared to children and adults (see Kilford et al. (2016) for a review). Additionally, bullies typically target more withdrawn children (Bernstein & Watson, 1997), and so avoidant safety behaviours may place the socially anxious adolescent at an elevated risk of being victimized.

However, one cannot assume that *adult* maintenance models of social anxiety will necessarily apply to the persistence of social anxiety in *adolescents*. In order to determine the cognitive behavioural processes that are important in maintaining adolescent social anxiety, I suggest adopting a stepwise approach (c.f. Clark (2004)). The first step would

involve observing the clinical phenomena in adolescents. Subsequently, rigorous experimental studies are needed in order to determine the extent to which these processes are causally implicated in adolescent social anxiety.

1.6. Preliminary Evidence for Cognitive Therapy for Adolescent SAD

Cognitive therapy for SAD in adults is comprised of a series of techniques designed to reverse the processes specified in the Clark & Wells cognitive model (1995). Broadly, the treatment adopts an approach which encourages the patient to discover for themselves how their social anxiety is maintained. This is achieved through a focus on experiential exercises; for example, a behavioural experiment is undertaken early on in therapy to demonstrate the unhelpful effects of self-focused attention and safety behaviours. Similarly, patients learn to focus their attention externally through a series of practical exercises. I think that this approach, of fostering cognitive change through action, is particularly well suited to adolescents, and expect that many of the core elements of treatment could be employed successfully with adolescents with modest adaptations.

To date, only two RCTs have been undertaken examining the effectiveness of therapeutic interventions based on the cognitive model of Clark and Wells (1995) with under 18's. One of these also involved children (Melfsen et al., 2011) but I describe it briefly here for interest. 44 socially anxious young people aged between 8 and 14 years of age were randomly allocated to individual therapy based on the cognitive model or to a wait-list control group. The authors reported medium to large effects of individual therapy compared to wait list control on clinician reported (German version of the Anxiety Disorders Interview Schedule; $d = 0.96$) and self-reported outcomes (German version of the Social Phobia Anxiety Inventory; $d = 0.91$). The results are certainly encouraging. However, the treatment did not represent a full implementation of cognitive therapy. For

example, five to six sessions were dedicated to psychoeducation. In cognitive therapy we would usually spend no longer than 15 minutes on this in session one. Critical components, such as the safety behaviour and self-focused attention behavioural experiment that is undertaken in session two of cognitive therapy, were not included. In addition, the trial was with children not adolescents.

Ingul, Aune, and Nordahl (2014) undertook a RCT with socially anxious adolescents in which individual therapy based on the cognitive model was compared to the adolescent group version of Coping Cat (The CAT Project) and an attention placebo. The attention placebo involved group meetings in which socially anxious young people interacted with peers and adults to a similar degree to the treatment arms but did not receive any of the hypothesized active components of the two treatments. A large effect of individual therapy was found on the SPAI post-treatment (pre-post $d = 2.96$). Surprisingly there was no effect of Group CAT on self-reported SPAI (pre-post $d = -0.10$) and a small effect of attention placebo ($d = 0.50$). The benefits of individual therapy were maintained at follow-up. Between group comparisons point to specific treatment effects: individual therapy outperformed both Group CAT (controlled $d = 1.94$) and attention placebo (controlled $d = 1.27$). The results are promising with regards individual therapy; however, treatment was not wholly consistent with cognitive therapy. For example, the first three sessions comprised psychoeducation about anxiety, drawing up a broad model of anxiety maintenance, developing an anxiety thermometer and hierarchy, and learning about negative thoughts and thinking errors. An individualised version of the cognitive model was not introduced until session four (compared to session one in cognitive therapy).

I undertook a treatment development case series to test preliminary feasibility of cognitive therapy with adolescents (Leigh & Clark, 2016). Cognitive therapy was delivered to five adolescents, all of whom had severe and chronic SAD as well as

comorbid difficulties at the start of treatment. Four of the five had already received a standard course of CBT without apparent response. By the end of treatment, symptoms of social anxiety, as well as associated anxiety and depression, had reduced to subclinical levels and these gains were maintained at three to six-month follow-up. All the young people also showed improved functioning, as evidenced by increased social participation and 100% school attendance at follow-up. Excitingly, we had the first indication that social anxiety treatment may also have a positive impact on classroom concentration, as evidenced by the self-reported improvement across all five patients. The average change (79%) on the primary outcome measure (the Liebowitz Social Anxiety Scale; Liebowitz (1987)) was greater than observed in trials of cognitive therapy in adults (57% and 63% in Clark et al., 2003, 2006). However, the therapist in this study had received extensive training in cognitive therapy and therefore, more recently I undertook a study testing whether therapists working in Child & Adolescent Mental Health Services (CAMHS) could be trained to deliver the treatment to socially anxious adolescents. Outcomes from this small study (n=12) were promising, with an average reduction of 68% on the LSAS, and reliable and clinically significant change observed in nine of the twelve patients (Taylor et al., 2021; Leigh, Creswell, et al., 2021).

Although the evidence base is still small, the results converge to suggest cognitive therapy may have important promise for adolescents with SAD. Notably, although the trial of Ingul et al. (2014) did not test the full treatment, it demonstrated specific treatment effects.

1.7. Internet-delivered Therapy

Whilst there are encouraging advances in treatment development for adolescent SAD, there are major obstacles to treatment access and service provision (Frith, 2017). Most young people with mental health disorders do not receive any treatment and the

treatment gap is particularly large for youth with anxiety disorders (Merikangas et al., 2011). For example, the US National Comorbidity Survey reported that less than 1 in 5 adolescents received services for an anxiety disorder, and only 12% of young people with SAD received any treatment rising to 21% amongst those with severe SAD (Merikangas et al., 2011). Even for those who do access treatment, the majority do not receive an adequate, evidence-based intervention (Wang et al., 2007). There are many reasons for the unmet need. These include parent and child level factors, such as stigma, lack of awareness, and low trust in professionals (Reardon et al., 2017), and also service level factors, including failure to detect SAD by primary care professionals, limited resources of CAMHS leading to long waiting times, and a limited number of trained therapists (Taylor et al., 2021; O'Brien, Harvey, Howse, Reardon, & Creswell, 2016).

There is clearly a need to develop effective, scalable treatments in order to bridge the treatment gap that exists for the majority of adolescents with SAD. One potential solution to the problem of limited access is the use of the internet to deliver therapy. Potential benefits to services of internet-delivered therapy include reduced therapist time and reduced burden on clinics, for example, by lowering the need for clinic space. Internet-delivered therapy may be preferred by service users too. For example, it may be more convenient because individuals can use the treatment programme when it suits them. Travel time and costs for attending sessions are minimised. The disruption to the working/studying day caused by therapy sessions, typically scheduled during working/school hours, is also almost eliminated.

In order to harness these benefits, adult cognitive therapy for SAD has recently been adapted for online delivery. Therapist contact is all remote (email, text, phone) and therapist time is reduced to only 30% of that in face-to-face therapy (Stott et al., 2013). A

recent RCT with socially anxious adults found that the internet therapy has similar effects to face-to-face cognitive therapy (Clark et al., *in prep.*).

There is reason to think that treatment delivered via the internet may be especially appealing to young people. Young people have grown up with the internet and interact with the online environment in all aspects of their lives. Young service users tend to hold more positive attitudes towards internet-delivered treatments compared to adults (Sweeney, Donovan, March, & Forbes, 2019; Hollis et al., 2017). Accessing a treatment online may provide a greater sense of confidentiality and reduced embarrassment (Sweeney et al., 2019), which may be a particular benefit to young people, for whom shame and embarrassment are the main barrier to accessing mental health support (Radez et al., 2020), and even more so for those with social anxiety for whom these feelings are so typical (Olfson et al., 2000).

Delivering health interventions, such as cognitive therapy for SAD, to adolescents via the internet offers benefits to service providers, families and young people, and wider society via the reduced burden associated with the disorder. Although an internet version of cognitive therapy for SAD has been developed and tested with adults, the potential of this treatment for adolescents is yet to be examined.

1.8. Improving Measurement

Valid and reliable measurement tools that assess social anxiety and its core cognitive behavioural maintenance processes are essential to aid the delivery of psychological treatment approaches, such as cognitive therapy, and advance research into underlying theoretical models.

1.8.1. Social Anxiety Symptom Measures

Scales for the measurement of symptoms are important for the detection of social anxiety, to monitor change, and in order to guide treatment of the disorder. Self-report measures provide a quick method of assessment that affords individuals the opportunity to report on anxiety from their own perspective, which is particularly relevant for adolescents with internalised social worries, for whom much of the problem may be unobservable.

Typically, measures have been designed to assess anxiety symptoms in youth broadly and include a number of items assessing social anxiety specifically. Widely used examples include the Screen for Anxiety and Related Disorders (SCARED; Birmaher et al. (1997)), the Revised Child Anxiety and Depression Scale (RCADS; Chorpita, Yim, Moffitt, Umemoto, and Francis (2000)), the Spence Children's Anxiety Scale (SCAS; Spence (1998)) and the Multidimensional Anxiety Scale for Children (MASC; March, Parker, Sullivan, Stallings, and Conners (1997)). The psychometric properties of each of these measures has been examined in adolescent samples (see Wong, Gregory, and McLellan (2016) for a review). However, whilst the social anxiety subscale of the MASC, the SCARED, and the SCAS has been shown to distinguish young people with SAD from those without (Wei et al., 2014; Anderson, Jordan, Smith, & Inderbitzen-Nolan, 2009; Birmaher et al., 1999; Spence, 1998), the small number of items relating to social anxiety in these broad-based measures limits their utility for guiding treatment.

A number of measures have been developed to measure social anxiety symptoms specifically (Wong et al., 2016; Garcia-Lopez, Salvador, & De Los Reyes, 2015). Two well-established measures are the Social Phobia and Anxiety Inventory for Children (SPAI-C; Beidel, Turner, and Morris (1995)) and the adolescent version of the Social Anxiety Scale for Children (SAS-A; La Greca and Lopez (1998); La Greca and Stone (1993)). The SPAI-C assesses thoughts, behaviour, and physiological responses in a range

of social settings, and items map onto the Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition (DSM-IV) diagnostic criteria. The SAS-A includes items that measure three aspects of social anxiety: fear of negative evaluation; avoidance and distress in new social situations; and general social avoidance and distress). Both scales have acceptable construct validity (Inderbitzen-Nolan, Davies, & McKeon, 2004) and have been shown to be sensitive to change (Herbert et al., 2009; March, Entusah, Rynn, Albano, & Tourian, 2007).

Another measure of social anxiety, which may offer certain advantages over the measures described above, is the Liebowitz Social Anxiety Scale for Children and Adolescents (LSAS-CA). The scale, first developed for adults (LSAS; Liebowitz (1987)), is comprised of 24 items covering a range of social situations (11 items), e.g., '*talking with people I don't know well*' and performance situations (13 items), e.g., '*speaking up at a meeting*'. Each item is rated on two 4-point Likert scales, one assessing the anxiety the situation elicits and the other assessing avoidance. A total score can be generated (range: 0-144), or separate scores for anxiety and performance, and social and performance situations. The LSAS may be particularly useful to researchers and clinicians because it assesses avoidance and anxiety across a wide range of social and performance situations, thereby not only quantifying social anxiety severity but also providing important information to guide treatment. For example, the questionnaire ensures the therapist is aware of the full range of situations that are avoided and so these can be addressed in treatment.

Originally developed as a semi-structured interview, the LSAS was later adapted into a self-report version. Compared to the clinician-administered version, the self-report LSAS has the advantage of being quicker to complete as well as not requiring particular expertise or training for administration. Both the clinician-administered and self-report

versions of the adult scale have good internal consistency and show convergent and divergent validity (Baker, Heinrichs, Kim, & Hofmann, 2002; Fresco et al., 2001; Heimberg et al., 1999). The self-report version of the LSAS has also been shown to be sensitive to change and to possess good test-retest reliability (Baker et al., 2002). Two-factor (fear and avoidance) and four-factor (social interaction, public speaking, observation by others, and eating and drinking in public) models have been proposed (Safren et al., 1999; Heimberg et al., 1999).

The semi-structured LSAS was also adapted for children and adolescents by Masia-Warner and colleagues (LSAS-CA; Masia-Warner, Klein, and Liebowitz (1999)). The scale is comparable to the adult version in terms of item number and scoring. Items were changed to better reflect the situations young people face, such as school settings. The final 24 items include 12 social situations, for example, '*talking with other kids I don't know well*', and 12 performance situations, such as '*asking questions in class*'. The authors of the scale undertook an initial psychometric investigation of the LSAS-CA and found that it showed good internal consistency and convergent and divergent validity (Masia-Warner et al., 1999). However, whilst the LSAS-CA is widely used, it is lengthy to complete and requires a clinician for administration, limiting its utility. In response to this, self-report versions of the LSAS-CA have been developed and examined in Spanish, French and Hebrew languages (Schmits, Heeren, & Quertemont, 2014; Shachar, Aderka, & Gilboa-Schechtman, 2014; Olivares, Sánchez-García, & López-Pina, 2009). However, the English language self-report version of the LSAS for children and adolescents has not yet been validated.

1.8.2. Measures of Social Anxiety Related Cognitions

Section 1.5. outlined cognitive behavioural models of social anxiety that suggest that negative thoughts about oneself and others' reactions in social situations, such as "*people will see that I am nervous*", "*I will blush*", and "*I am boring*", play a central role in the disorder (Heimberg et al., 2010; Hofmann, 2007; Rapee & Heimberg, 1997; Clark & Wells, 1995). In order to advance our knowledge of cognitive behavioural models of social anxiety in young people and to guide associated treatments, there is a need for valid and reliable measures of social anxiety related cognitions.

In adults, various scales for assessing such thoughts have been developed, including the Social Cognitions Questionnaire (Wells, Stopa, & Clark, 1995). The Social Cognitions Questionnaire (SCQ) was developed in order to quantify social anxiety-related cognitions (Clark, 2003). It is comprised of 22 items, each reflecting a common social anxiety-related cognition (e.g., "*people will stare at me*"). Items are rated on two dimensions: how frequently the thought occurs in social situations, and how strongly the thought is believed. In adults, the scale has been shown to have good internal consistency (Clark, 2005) and test-retest reliability (Tanner, Stopa, & De Houwer, 2006). A three or four factor structure was indicated in preliminary work of Clark (2005), with the first factor clustering around the concept of negative self-concept (e.g. "*I am unlikeable*"), and the second and third factors reflecting concerns about the appearance of anxiety (e.g. "*I will be unable to speak*" in factor 2 and "*I am going red*" in factor 3). The fourth factor, reflecting inferiority, accounted for a relatively small amount of variance and had only two strong item loadings. Treatment studies have shown large reductions in frequency and belief ratings on the SCQ over treatment (Thew et al., 2019; Stott et al., 2013), indicating that the scale is sensitive to change. Analysing data of adult patients treated in routine care, the SCQ was found to mediate the effect of treatment on outcome (Thew et al., 2020).

Surprisingly, only two measures of social-evaluative cognition have been evaluated for use with young people. The Child Automatic Thoughts Questionnaire (Schniering & Lyneham, 2007; Schniering & Rapee, 2002) was designed to measure a range of negative thoughts across anxiety domains, and includes 10 items relating to social threat, for example "*other kids are making fun of me*". The scale has been shown to be reliable and valid, however as pointed out by Wong and colleagues (Wong et al., 2018), the scale measures 'in the moment' negative automatic thoughts but it does not assess broader social-evaluative beliefs. The Report of Youth Social Cognitions is a 14-item measure that was developed recently to examine social-evaluative beliefs in youth (Wong et al., 2018), including items such as "*other kids think I'm silly*". Whilst the scale was shown to have good psychometric properties (Wong et al., 2018), it does not include items capturing the particular ways socially anxious youth fear they will behave in social situations (e.g. "*I will go red*", "*I will stumble over my words*"). These cognitions are a central feature of cognitive behavioural models of social anxiety (Wong & Rapee, 2016) and a target for therapies based on these models. In adults, the SCQ measures these cognitions, as well as broader social-evaluative beliefs such as "*I am boring*". However, the SCQ has not yet been adapted for youth.

1.9. Research Questions

The overarching aim of the present thesis is to improve our understanding of the cognitive and behavioural maintenance mechanisms of adolescent social anxiety, to develop and assess measurement tools to guide research and treatment, and to develop effective and scalable interventions.

The studies presented in this thesis address the following three questions:

Research Question 1. Are the psychological processes specified in the cognitive model of Clark & Wells (1995) applicable and causally related to adolescent social anxiety?

In order to address this question, Study 1 (Chapter 2) describes a systematic review of empirical studies that have examined the association between the cognitive behavioural processes specified in the model and adolescent social anxiety. Then in Studies 2 and 3, I describe two experimental studies that examine whether the key processes are causally implicated in adolescent social anxiety. Study 2 describes a study manipulating mental imagery (Chapter 3) and Study 3 describes a study manipulating self-focused attention and safety behaviours (Chapter 4).

Research Question 2. Can self-report measures reliably and validly measure social anxiety symptoms and social anxiety-related cognitions in adolescents?

Valid and reliable measurement tools of adolescent social anxiety and social anxiety related cognitions are needed in order to improve our theoretical understanding of youth social anxiety and aid the delivery of psychological interventions targeting these processes. Study 4 examines the psychometric properties of a self-report English language version of a measure of social anxiety symptoms (the Liebowitz Social Anxiety Scale for Children and Adolescents; LSAS-CA) in a general population adolescent sample (Chapter 5). Study 5 describes the adaptation of a measure of social anxiety related cognitions for children and adolescents (the Child and Adolescent Social Cognitions Questionnaire; CASCQ) and its preliminary validation (Chapter 6).

Research Question 3. Is treatment based on the Clark & Wells model that is delivered to adolescents via the internet superior to a waitlist?

Effective, scalable interventions for adolescent SAD have the potential to reduce the long-term individual, familial and societal costs associated with the disorder. Study 6 outlines the adaptation of internet-delivered cognitive therapy for adolescent SAD and describes a RCT testing its efficacy compared to a waitlist control (Chapter 7).

CHAPTER 2. APPLYING CLARK & WELLS' (1995) COGNITIVE MODEL OF SOCIAL ANXIETY TO ADOLESCENTS: A SYSTEMATIC REVIEW.

A version of this chapter has been published in *Clinical Child & Family Psychology Review* (see Appendix):

Leigh, E. & Clark, D.M. (2018). Understanding Social Anxiety Disorder in Adolescents and Improving Treatment Outcomes: Applying the Cognitive Model of Clark and Wells (1995). *Clinical Child & Family Psychology Review, 21*(3), 388-414. doi: 10.1007/s10567-018-0258-5

2.1. Introduction

As discussed in Chapter 1, according to the Clark and Wells' cognitive model (Clark & Wells, 1995), social anxiety related cognitions are critical to the maintenance of the condition in adults. Negative social anxiety-related cognitions are proposed to be maintained by a further three processes: self-focused attention, negative self-imagery (collectively described as 'processing of the self as a social object'), and safety behaviours. Before and after an event, it is suggested that individuals engage in pre- and post-event processing which further maintains the cycle of social anxiety

There is substantial support for the role of each of these processes in adult social anxiety. A review of studies examining negative social cognitions found that of 89 studies in total, 72 found evidence of a positive association with adult social anxiety (Wong & Rapee, 2016). Nine of these 72 studies were experimental in design, with the rest cross-sectional and correlational. In their narrative review, Norton and Abbott (2016) conclude

that there is considerable evidence indicating that self-focused attention is associated with increased anxiety, more negative self-judgments, and poorer perception of social performance in adults. A narrative review of studies examining the role of negative self-imagery (Ng, Abbott, & Hunt, 2014) concluded negative self-images have a detrimental effect on anxiety, self-rated and observer-rated performance appraisals, and negative thoughts. Piccirillo, Taylor Dryman, and Heimberg (2016) identified 91 studies that have examined the role of safety behaviours in adult social anxiety, and concluded that they are associated with increased anxiety, worse self- and observer-rated performance, and negative self-judgements. A narrative review of Penney and Abbott (2014) concluded that the link between post-event processing and social anxiety is well-supported. Whilst there is supportive evidence of an association between pre-event processing and social anxiety, studies have mainly been limited to analogue samples.

As well as the theoretical importance of better understanding the phenomena, identifying psychological processes that maintain social anxiety has also provided the opportunity to optimise treatment outcomes. For example, cognitive therapy was developed by Clark and colleagues (Clark et al., 2003) to target the processes specified in the model of Clark and Wells (1995), and the treatment has demonstrated efficacy and evidence of treatment specificity (Mayo-Wilson et al., 2014).

In contrast to the substantial evidence base for the cognitive model of Clark and Wells (1995) in adults, there has not yet been a review of empirical studies in adolescents. The principal aim of this chapter was therefore to undertake a systematic review of the literature to identify studies that have examined the association between the key processes specified in the cognitive model of Clark and Wells (1995) and adolescent social anxiety.

2.2. Method

A review was undertaken to assess the available evidence in relation to the cognitive model of Clark and Wells (1995) in adolescents. The studies I was interested in focus on the *maintenance* of social anxiety rather than the development or etiology of the disorder. That is not to say that it is not valuable and important to understand the genesis of social anxiety disorder in young people. Rather, I was concerned here in delineating the mechanisms by which social anxiety is maintained in adolescents as a route to developing targeted and effective therapeutic interventions. Studies with young people aged 11 to 18 years are included. This age range was selected for two reasons. First, the adolescent period is the peak period of onset of SAD. Second, whilst a definition of adolescence as defined by years is arbitrary because the on- and off-set of puberty will vary from individual to individual, the upper and lower limits of 11 and 18 years coincide with the start and end of secondary school in many countries. Studies with a lower age limit below 11 years were retained if the average age was at least 12 years. We included data on non-clinical as well as clinical populations. As noted by Stopa & Clark (2001), social anxiety is continuously distributed in the general population and so comparing (non-clinical) individuals at the relatively high and low ends of a measure of social anxiety seems a meaningful way of researching psychological processes implicated in social anxiety.

We searched the databases PsycINFO and Web of Science for peer-reviewed articles written in English published between 1995 and the date the search was conducted (28th November 2017). The following search terms were used: *(social* AND (anxiet* OR anxious* OR phobi*)) AND ((cognitive AND model) OR (wells AND clark) OR (cognit* OR assumption* OR (interpretat* AND bias) OR belief*) OR image* OR (safety AND behav*) OR (self AND focus* AND attention*) OR ((event AND processing) OR worry OR worri* OR ruminat*)) AND (teen* OR adolescen* OR young OR youth*)*. To be included

studies had to include adolescent samples in which social anxiety symptoms had been assessed as well as at least one of the psychological variables specified in the cognitive model of Clark and Wells (1995). Review papers, studies evaluating measures and scales, and treatment studies were excluded. A PRISMA flowchart showing the selection of papers is presented in Figure 2.1. Twenty-five studies are included in the final review (please see Table 2.1. for a full list of included studies).

Effect sizes (ES) are provided. These are either reported directly from studies (where provided), or I have calculated them if they were not reported. For studies involving correlational analysis I have reported *r* and for group differences studies I have reported Cohen's *d*. *r* is interpreted according to Cohen's (1988) criterion whereby a small effect is at least 0.1, a medium effect is of a magnitude of at least 0.3, and an effect size greater than 0.5 is deemed large. Cohen's *d* is interpreted as such: at least 0.2 is a small effect, at least 0.5 is a medium effect and at least 0.8 is a large effect.

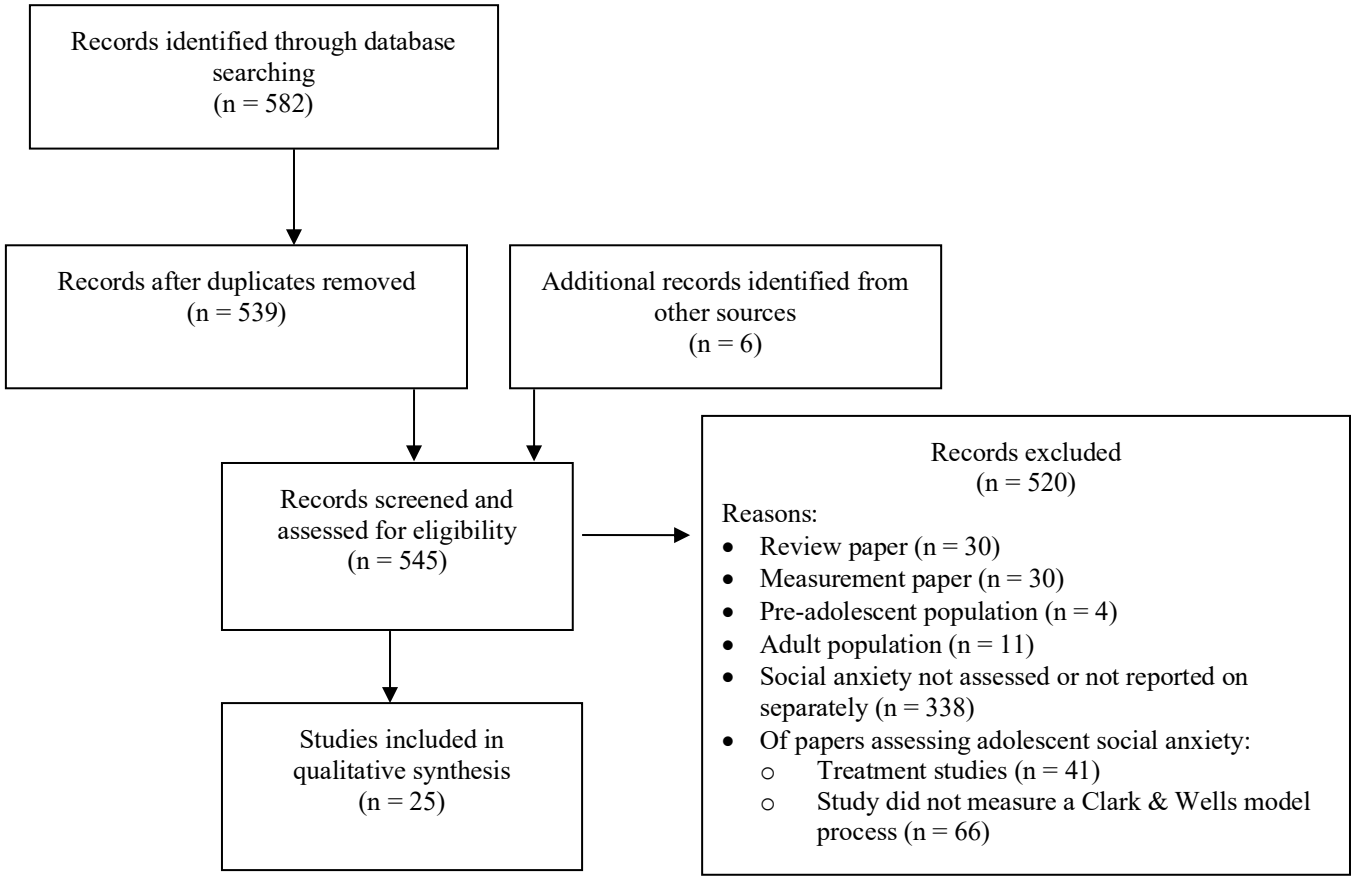


Figure 2.1. Flow diagram showing selection of papers.

Table 2.1. Studies included in review.

Author	Year	N	Age Range (y)	Mean age (sd)	Recruitment	Social Anxiety Measure
Alfano, Beidel, & Turner	2006	48	12-16	13.6 (1.28)	Clinic sample recruited from anxiety outpatient clinic	SPAI-C
					Healthy controls recruited via advert	
Alfano, Beidel, & Turner	2008	63	not reported	13.54 (1.21)	Clinic sample recruited from anxiety outpatient clinic	SPAI-C
					Healthy controls recruited via advert	
Anderson & Hope	2009	392	13-17	14.50 (1.27)	Community sample recruited from school	SPAI-C
Anderson, Veed, Inderbitzen-Nolan, & Hansen	2010	170	13-17	14.7 (sd not reported)	Community sample recruited from school	SAS-A, SPAI-C
Blöte, Miers, Heyne, Clark, & Westenberg	2014	161	14-18	16.00 (1.38)	Community sample recruited from school	SAS-A
Erath, Flanagan, & Bierman	2007	84	11-13	not reported	Community sample recruited from school	SAS-A
Giannini & Loscalzo	2016	65	14-17	15.43 (1.00)	Community sample recruited from school	SPIN
Haller, Doherty, Duta, Kadosh, Lau, & Scerif	2017	51	14-19	16.73 (1.26)	Community sample recruited from school	SAS-A
Haller, Raeder, Scerif, Kadosh, & Lau	2016	95	14-17	16.67 (1.05)	Community sample recruited from school	SAS-A
Hignett & Cartwright-Hatton	2008	124	12-18	12.1 (0.25)	Community sample recruited from school	SPAI-C
Hodson, McManus, Clark, & Doll	2008	171	11-14	12.24 (0.97)	Community sample recruited from school	SPAI-C
Loscalzo, Giannini, & Miers	2017	90	13-17	15.30 (1.06)	Clinic sample recruited from outpatient clinic	SPIN
					Healthy controls recruited from schools	
Miers, Blote, Bogels, & Westenberg	2008	73	11-17	13.61 (36.82)	Community sample recruited from school	SAS-A
Miers, Blote, Heyne, & Westenberg	2014	331	9-17	13.34 (2.25)	Community sample recruited from school	SAS-A

Author	Year	N	Age Range (y)	Mean age (sd)	Recruitment	Social Anxiety Measure
Miers, Blote, Sumter, Kallen, & Westenberg	2011	127	9-17	13.02 (2.20)	Community sample recruited from school	SAS-A
Morgan & Banerjee	2006	56	11-13	12.65 (sd not reported)	Community sample recruited from school	SAS-A
Parr & Cartwright-Hatton	2009	36	13-17	14.74 (1.48)	Community sample recruited from school	SPAI-C
Pergamin-Hight, Bitton, Pine, Fox, & Bar-Haim	2016	113	6-18	12.40 (3.16)	Clinic and control samples recruitment method not reported	SPAI
Rabner, Mian, Langer, Comer, & Pincus	2018	60	13-18	14.9 (1.6)	Clinic sample recruited from anxiety outpatient clinic	MASC
Ranta, Tuomisto, Kaltiala-Heino, Rantanen, & Marttunen	2014	135	15-16	15.9 (0.32)	Community sample recruited from school	SPIN
Rheingold, Herbert, & Franklin	2003	66	12-17	15.16 (1.4)	Clinic sample recruited from anxiety outpatient clinic and advert	SPAI-C
					Healthy controls recruited via advert	
Rudy, Davis, & Matthews	2014	245	8-16	13.27 (2.14)	Community sample recruited from school	SPAI-C
Schreiber & Steil	2013	62	14-20	16.6 (2.21)	Clinic sample recruited from anxiety outpatient clinic	SPAI
					Healthy controls recruited via advert	
Schreiber, Höfling, Stangier, Bohn, & Steil	2012	581	14-19	16.49 (1.67)	Community sample recruited from school	SPAI
Thomas, Daruwala, Goepel, & De Los Reyes	2012	40	14-17	15.15 (0.97)	Clinic and control samples recruited via advert	MASC

NOTES: SPAI-C = Social Phobia Anxiety Inventory for Children (Beidel et al., 1995); SAS-A = Social Anxiety Scale for Adolescents (La Greca & Lopez, 1998); SPIN = Social Phobia Inventory (Connor et al., 2000); SAS-CR = Social Anxiety Scale for Children Revised (La Greca & Stone, 1993); SPAI = Social Phobia Anxiety Inventory (Turner, Beidel, Dancu, & Stanley, 1989); MASC = Multidimensional Anxiety Scale for Children (March et al., 1997).

2.3. Results

2.3.1. Negative cognitions and perceived social danger

Negative social attitudes and cognitions. According to the cognitive model, individuals with social phobia hold dysfunctional assumptions about themselves that are activated in anticipation of a social situation ("*I must always speak fluently*"). Negative social cognitions about oneself (e.g., "*I will stutter*") and about other peoples' reactions ("*people will think I'm stupid*") predominate. Supportive evidence for this hypothesis in adolescents is provided by three questionnaire-based studies. Schreiber, Höfling, Stangier, Bohn, and Steil (2012) and Hodson, McManus, Clark, and Doll (2008) reported studies undertaken with German (aged 14-20 years) and UK (aged 11-14 years) school samples respectively. In their large non-clinical sample of 581 German adolescents and young adults, Schreiber et al (2012) found that those scoring in the upper quartile of the German version of a measure of social anxiety, the Social Phobia Anxiety Inventory (SPAI; Turner et al. (1989)) endorsed more frequent negative social cognitions in social situations (e.g. "*I am boring*", "*I will blush*") on the Social Cognitions Questionnaire (Clark, 2003). In the only study to look at negative social attitudes, the authors also found that those scoring in the top quartile on the SPAI rated themselves more highly on negative social attitudes (e.g. "*I must be witty and intelligent at all times*") on the Social Attitudes Questionnaire (Clark, 2003) compared to those in the lower quartile. Effect sizes were large for both cognitions and attitudes; d = 1.56 and 1.74 respectively. In regression analyses, both social cognitions and social attitudes were significant independent predictors of social anxiety across the whole sample (all four quartiles), but they were also predictors of depression. Similarly, the smaller UK study with 171 non-clinical adolescents (Hodson et al., 2008) found that those scoring in the top quartile on the Social Phobia Anxiety Inventory for Children (SPAI-C; Beidel et al. (1995)) reported more frequent negative social cognitions on the

Social Cognitions Questionnaire compared to those in the middle quartiles (d = 1.20) and the lowest quartile (d = 1.40). The 'middle' and 'low' groups did not differ from each other (d = 0.39). Also, in line with the findings of Schreiber and colleagues, regression analyses indicated that social cognitions were a significant independent predictor of both social anxiety and depression. In the third questionnaire study, Rudy, Davis, and Matthews (2014) examined self-report questionnaire measures of negative social cognitions, self-efficacy and social anxiety in a US sample of 260 healthy adolescents aged 8 to 16 years. Negative social cognitions (e.g., "*I sound stupid*") were associated with social anxiety both directly (r = 0.66) and indirectly via their effect on self-efficacy.

Using a semi-structured interview methodology, Ranta, Tuomisto, Kaltiala-Heino, Rantanen, and Marttunen (2014) asked adolescents to identify a time when they had felt very socially anxious and to then recall the thoughts that they had during the experience. Those scoring higher on the Social Phobia Inventory (SPIN; Connor et al. (2000)) recalled more negative thoughts than those scoring lower (d = 0.48). Although the numbers of young people with clinical levels of SAD were small, the findings were similar when the authors compared those assigned a diagnosis of clinical or subclinical social anxiety disorder (n = 17) compared to those with no diagnosis of SAD (n = 116; d = 0.58). In line with Stopa & Clark's (1993) finding in adults, negative thoughts recalled by the adolescents were most commonly self-focused rather than focused on other people or the interaction. In another study comparing a sample of adolescents with social anxiety disorder with a group of healthy controls, Alfano, Beidel, and Turner (2006) asked participants to engage in a role-play task. The authors found that not only did socially anxious youth make more negative predictions about their performance than controls (d = 1.61), but they also went on to believe they performed poorly compared to controls (d =

1.56). Negative self-talk was significantly more frequent in socially anxious adolescents compared to controls (d = 0.69) and compared to socially anxious children (d = 0.67).

In summary, the studies described above are all consistent with the cognitive model. Negative social cognitions and attitudes are elevated in adolescents who experience more social anxiety. Two studies have suggested that this holds in clinical samples also. However, there are limitations to the data, most notably, all of the studies are correlational[1] and so the issue of whether cognitions are causally implicated in social anxiety cannot be resolved.

Negative interpretation bias. Social events are rarely conclusively negative and yet socially anxious individuals will often draw very negative conclusions about their social performance and others' reactions. Considerable evidence has amassed in support of the presence of a bias amongst socially anxious adults towards interpreting ambiguous events in a negative way and appraising mildly negative events catastrophically (Mobini, Reynolds, & Mackintosh, 2013). A study by Stopa and Clark (2000) provides particularly clear evidence for this. Adults with social anxiety disorder and healthy controls were presented with ambiguous scenarios depicting social and non-social events, and with unambiguous scenarios depicting mildly negative social events. Socially anxious adults not only made more negative interpretations of ambiguous social scenarios, but they were also more likely to catastrophize unambiguous, mildly negative social events. In pre-adolescent children there are fewer studies, but a review concluded that there is reasonable evidence for the association of a negative interpretation bias with social anxiety (Halldorsson & Creswell, 2017).

[1] The term 'correlational' is used to refer to observational studies that measure co-variation either within or between groups but do not experimentally manipulate the variable.

Turning now to adolescents, in their review, Haller et al. (2015) note that the refinement of neurocognitive abilities such as perspective-taking coupled with exposure to increasingly large and complex social networks may make some adolescents especially susceptible to drawing negative social conclusions compared to children and adults. Studies examining interpretation bias in adolescent social anxiety have used a range of methods. Four studies, with Dutch (Miers, Blote, Bogels, & Westenberg, 2008), Italian (Loscalzo, Giannini, & Miers, 2017; Giannini & Loscalzo, 2016), and US (Rheingold, Herbert, & Franklin, 2003) samples, have employed a questionnaire measure of interpretation bias. In three of the studies (Loscalzo et al., 2017; Giannini & Loscalzo, 2016; Miers et al., 2008) participants were given the Adolescent Interpretation and Belief Questionnaire (Miers et al., 2008). The questionnaire presents a series of ambiguous social and non-social scenarios followed by three possible interpretations (positive, negative, and neutral). Respondents are asked to rate how likely the interpretations are to pop into mind and how much they believe them.

Miers and colleagues (2008) found that adolescents scoring high (in the top 10%) on a measure of social anxiety (the Social Anxiety Scale for Adolescents (SAS-A; La Greca and Lopez (1998)) made significantly more negative interpretations of social events than the average anxiety group (those scoring in the 45-55th centile on the SAS-A; d = 1.18) and believed these more strongly (d = 0.54). There were no differences in positive interpretation of social events (d = 0.28). High social anxiety adolescents were also more likely to make negative interpretations (d = 0.62) of non-social situations and to believe these negative interpretations (d = 0.59) more than average anxiety adolescents. In line with these findings, Giannini and Loscalzo (2016) found high social anxiety adolescents (those scoring in the top 10% on the SPIN) endorsed more frequent negative interpretations of social situations (d = 0.84) and believed these more than those with

average levels of social anxiety (scoring between 45-55th centile on the SPIN; d = 1.19). However, there were some differences between the two studies. First, in this study, high social anxiety adolescents also made fewer positive interpretations (d = 0.70) than the average social anxiety scorers (whereas no differences were found on this measure by Miers et al (2008)). Second, this study did not find any differences in interpretation of non-social situations, whereas a difference had been identified in the study by Miers et al (2008).

The study by Loscalzo et al. (2017) compared 50 adolescents with a clinical diagnosis of social phobia with non-clinical adolescents scoring high or low on the SPIN. This study also used the Adolescent Interpretation and Belief Questionnaire. In line with the findings of Miers et al. (2008) there were no group differences in positive interpretations of social situations, but the social anxiety disorder group and the high social anxiety group made more frequent negative interpretations of social situations than those in the low social anxiety group (d = 1.82; 1.82, respectively). Those in the social anxiety disorder group believed the negative interpretations more than those in the high (d = 0.56) and low (d = 0.75) social anxiety groups, who did not differ from each other (d = 0.14). In terms of content-specificity, adolescents with social anxiety disorder also made more negative interpretations of non-social ambiguous scenarios and believed these more strongly than non-clinical adolescents with either high or low social anxiety. Another correlational study was undertaken by Rheingold et al. (2003). Adolescents with a diagnosis of social anxiety disorder and healthy controls completed a questionnaire measure assessing judgments of the likelihood and cost of social and non-social events. Socially anxious youth overestimated the cost (d = 1.87) and probability (d = 1.50) of negative social events and the cost of negative nonsocial events (d = 0.84) compared to controls, even after controlling for depression symptoms. However, none of these four

studies assessed interpretations 'on-line' and so we cannot determine whether they are measuring direct interpretations of events as they occur or rather some pre-existing negative beliefs.

Addressing the limitations associated with the self-report questionnaire method of assessing interpretation bias, a study by Haller, Raeder, Scerif, Kadosh, and Lau (2016) used a novel picture-based paradigm to measure interpretation bias amongst 95 young people aged 14 - 17 years recruited through schools. Participants were shown an ambiguous social scene with a photo of themselves inserted as the protagonist. They were presented with neutral, negative, and positive interpretations. Social anxiety was significantly negatively correlated with positive interpretation ratings (r = -0.48) and significantly positively correlated with negative interpretation ratings (r = 0.45). Extending this finding, Haller et al. (2017) asked a community sample of adolescents to interpret ambiguous social situations presented with naturalistic photographs. Eye tracking data was gathered as a proxy measure of attentional allocation. Social anxiety levels predicted a tendency to make more negative and less positive interpretations. Furthermore, participants who spent more time on facial displays made more threatening interpretations. In a study measuring online interpretation biases in a sample of young adolescents with social anxiety disorder and a group of healthy controls (Pergamin-Hight, Bitton, Pine, Fox, & Bar-Haim, 2016), the clinical group made more negative interpretations compared to the control group (d = 0.47).

In summary, seven studies have examined interpretation biases in social anxiety in adolescents. All point to an association between social anxiety and an increased tendency to draw negative interpretations of ambiguous social scenarios and to believe these more strongly. Findings are more mixed about the association between social anxiety and positive interpretations of social scenarios, and in relation to the interpretation of non-

social events. In addition, as yet no studies have examined whether socially anxious individuals tend to catastrophize in response to mildly negative social scenarios as would be predicted by the model.

2.3.2. Processing of the self as a social object

Enhanced self-focused attention linked to reduced processing of external social cues. The model would predict that when a social threat is perceived, socially anxious individuals shift their attention internally and reduce processing of external social cues. Indeed, socially anxious adolescents very often talk about being painfully self-conscious in social situations. To test this hypothesis, the questionnaire-based study of Hodson and colleagues (2008) included the Focus of Attention Questionnaire (FAQ; Woody (1996)). High socially anxious adolescents reported higher levels of self-focus compared to middle (d = 0.49) and low socially anxious youth (d = 1.09). Self-focused attention was associated with social anxiety across the whole sample (r = 0.42), and it was also an additional independent predictor of social anxiety, with and without simultaneous adjustment for depression scores. Consistent with this finding, Schreiber and colleagues (2012) also found that high socially anxious adolescents reported higher levels of self-focused attention (measured by the FAQ) compared to low scorers (d = 1.15). Self-focused attention was not found to be a significant independent predictor of social anxiety across the whole sample. The authors also looked at external focus of attention, measured by certain items of the Focus of Attention Questionnaire. No differences between groups were found on this subscale. The authors suggested this null finding might have resulted from the lack of specificity regarding the type of external focus captured by the items.

A more ecologically valid study was undertaken by Blote, Miers, Heyne, Clark, and Westenberg (2014). A sample of 14-18 year olds (n = 161) recruited through schools

gave a speech to a pre-recorded neutral audience. Questionnaire measures of social anxiety and self-focus (using the FAQ), performance expectation, and audience perception were completed. In relation to self-focused attention, it was found that social anxiety was associated with higher self-focus ($r = 0.43$). The relationship between social anxiety and audience perception was found to be partially mediated by negative expectations of performance and self-focused attention. In line with the findings of Schreiber et al (2012), external focused attention was not correlated with social anxiety ($r = 0.12$).

A longitudinal study was undertaken with a sample of unselected Dutch youth to examine pathways of social avoidance through adolescence and whether social anxiety and psychological processes, including self-focused attention (using the FAQ), discriminated between the pathways (Miers, Blote, Heyne, & Westenberg, 2014). A group of adolescents showed increasing social avoidance through adolescence and another group showed consistently low avoidance. Self-focused attention was not found to discriminate between the two groups. However, the study was designed to identify vulnerability factors for the development of social avoidance rather than current maintenance factors.

In summary, a number of studies have been reported on that have examined the role of self-focused attention in social anxiety. In all but one study (Miers et al., 2014), self-focused attention was found to be related to social anxiety (or group differences were shown) with a medium effect. However, conclusions are limited by a number of issues. First, none of the studies were undertaken with clinical populations. Second, all of the studies used the FAQ to measure self-focused attention, and often only used a small number of items taken from the questionnaire. Although the measure has been found to have moderate internal consistency, full psychometrics have not been reported with adolescents. Third, the studies cannot illuminate us on the causal role of self-focused attention in social anxiety; for this, experimental studies are needed.

Negative observer-perspective social images. The majority of adults with SAD report experiencing negative observer-perspective self-images in social situations (Hackmann, Clark, & McManus, 2000). These are often related to events dating back to around the onset of the disorder. A number of studies have examined negative self-imagery and social anxiety in adolescents. Three of these used questionnaire or interview methods. Ranta et al. (2014) found that high socially anxious adolescents (compared to low scorers) and adolescents with SAD or subclinical SAD (compared to no diagnosis) report more negative observer perspective self-images (d = 0.45 and r = 0.47, respectively). Similarly, in their study with unselected adolescents, Schreiber et al. (2012) found that high social anxiety adolescents reported more frequent negative self-images than low scorers (d = 0.81). Frequency of negative self-images was also found to independently predict social anxiety in the group as a whole. The study used the Questionnaire of Recurrent Images in Social Phobia (QRI-SP; Schreiber, Stangier, and Steil (2009)) which is based on the semi-structured developed by Hackmann et al. (2000) for adults to assess negative self-imagery. However, the study only used a single item of the measure (assessing the frequency of social-anxiety related imagery), and this may not be reliable for a multi-faceted construct such as self-imagery. Addressing this limitation, Schreiber and Steil (2013) administered the full QRI-SP as a semi-structured interview to 31 adolescents with a clinical diagnosis of SAD and to a matched sample of 31 healthy adolescents. They found that whilst all adolescents had experienced negative self-imagery in social situations in the past, those with SAD experienced images more frequently (d = 0.84), they were more distressing (d = 0.80) and more vivid (d = 0.54). These images were more likely to be experienced from the observer-perspective by those with SAD compared to controls (d = 0.75). Almost half of controls (45.2%) and two thirds of the SAD group (64.5%) identified a socially

traumatic event linked to the negative self-image, but this proportion did not differ between the groups. A study by Hignett and Cartwright-Hatton (2008) examined the hypothesis that the negative images experienced by socially anxious individuals tend to be experienced from an observer-perspective. 124 unselected adolescents aged 12 to 18 years gave a brief talk to a camera. They were then asked to bring to mind how they thought they had appeared and rate the extent to which this image was from the field or observer perspective. A modest but significant association between social anxiety (SPAI-C) and tendency to take the observer perspective ($r = 0.20$) was found.

A convincing demonstration of the causal role of negative self-imagery in social anxiety in *adults* was provided by Hirsch et al. (2004) (see also Hirsch, Clark, Mathews, and Williams (2003)). In their study, socially anxious adults took part in two conversations, holding either a negative or a benign image in mind. Findings were in line with the cognitive model: compared to a benign image, holding a negative social image in mind increased anxiety, negative appraisals and use of safety behaviours and led to a less positive evaluation by the conversation partner. Alfano, Beidel, and Turner (2008) undertook a similar experimental study with 63 SAD and healthy control adolescents. Adolescents undertook videotaped role-play and read aloud tasks. Afterwards they rated their anxiety and their social performance, and an independent assessor made objective ratings of their performance. Half the control participants were instructed to engage in negative self-imagery during the tasks and the other half received no instructions. Contrary to the hypotheses and the findings of Hirsch et al. (2004) with adults, few differences were found in observer- or self- rated anxiety or performance between the two control groups. The SAD group was consistently rated as more anxious and less socially competent. The authors concluded that negative self-imagery may be a consequence of social anxiety rather than a causal factor as suggested by the cognitive model. However, it seems

plausible that the null finding was due to design issues, in the sense that the manipulation of imagery was between-subjects which would give lower statistical power and also the control condition was not clearly defined. It is difficult to know what the imagery group was being compared to because participants in the comparison groups did not receive any instructions and were not subsequently asked about thought content during the experimental procedure. In comparison, the study of Hirsch et al. (2004) included a controlled within-subjects comparison (benign imagery). It therefore seems that there is scope for further causal experiments in adolescents including a tighter control over the experimental manipulation.

Video feedback with careful verbal preparation beforehand is a core cognitive therapy technique aimed at correcting negative and distorted self-imagery. Studies with adults have shown that the technique leads to more accurate appraisals of performance and reduced anxiety (Warnock-Parkes et al., 2017), providing corollary evidence for the role of self-images in social anxiety. Turning to studies with adolescents, Parr and Cartwright-Hatton (2009) examined the effect of video feedback with 36 highly socially anxious 14-17-year-olds. Video feedback was provided with careful preparation to prepare an unbiased mode of processing (c.f. Warnock-Parkes et al. (2017)). Compared to control participants (who were asked to sit quietly), young people who received video feedback after giving a speech felt less anxious about giving a subsequent speech (d = 1.43), predicted that they would perform better (d = 1.16) and went on to rate the later speech as better (d = 1.22). A somewhat similar study was undertaken with 11 to 13 year olds, scoring high and low on the SAS-A (Morgan & Banerjee, 2006). Adolescents took part in a role-play task, with half receiving video feedback and half completing a distractor task prior to rating their performance. In contrast to the findings of Parr and Cartwright-Hatton (2009), the study did not find any improvements in participants' performance ratings after

video feedback for the high (d = 0.17) or low anxiety groups (d = 0.16). However, participants were not given any preparation for the video feedback. We know from adult research that whilst almost all studies have found the technique to be helpful, the two studies that have failed to find positive effects of video feedback (Smits, Powers, Buxkamper, & Telch, 2006; Rodebaugh, 2004) did not include verbal preparation before watching the video. It is suggested that careful verbal preparation is needed in order to overcome the processing biases that can undermine the effectiveness of the technique (Warnock-Parkes et al., 2017).

Reviewing the studies that have looked at self-imagery in adolescent social anxiety we find consistent results from the three questionnaire and interview studies (Ranta et al., 2014; Schreiber & Steil, 2013; Schreiber et al., 2012), two of which reported on clinical samples. With a moderate effect, socially anxious youth reported more frequent negative observer-perspective social images compared to low scorers. The only experimental study to be undertaken (Alfano et al., 2008) did not find a detrimental effect of asking young people to engage in negative self-imagery but this may be due to design issues. Looking at the relevant data on video feedback, we find that in line with adult reports, the study that undertook video feedback with careful verbal preparation yielded positive effects of the technique, whilst the study that did not include it failed to find a benefit. Experimental studies with clinical and non-clinical samples including valid manipulations are still needed to test the model's hypothesis that negative self-imagery plays a causal role in adolescent social anxiety.

Use of internal information. The cognitive model would predict that socially anxious individuals use internal information made accessible by self-focused attention to make excessively negative inferences about how they look to others. This hypothesis has been

supported in studies with adults. For example, Mansell and Clark (1999) asked adults with high and low levels of social anxiety to undertake a speech task. Participants rated their perceived body sensations and how they thought they appeared during the task. An independent assessor also rated how they came across. Amongst adults with high, but not with low social anxiety, a significant correlation was found between perceived body sensations and how anxious they thought they looked. The correlation between assessor ratings and perceived body sensations was non-significant for both groups. The findings are consistent with the suggestion that socially anxious individuals use perceived bodily sensations to make erroneous, negative judgements about how they appear.

No studies have been undertaken examining this hypothesis with adolescents. Ancillary support has come from three studies that have compared subjective and objective measures of arousal in adolescents. In a study by Anderson and colleagues (2010), subjective physiological arousal and heart rate during a speech task were compared between 170 13 to 17 year olds with SAD, high social anxiety adolescents and non-anxious controls. SAD and high social anxiety adolescents both endorsed elevated self-reported arousal (measured on a subscale of items from the on Beck Anxiety Inventory (BAI) (Beck, Epstein, Brown, & Steer, 1988) compared to controls (SAD vs. low social anxiety $d = 0.71$; high social anxiety vs. low social anxiety $d = 0.45$), but did not differ from one another ($d = 0.33$). There were no differences in heart rate between the groups. Comparable findings were reported in an earlier study by Anderson and Hope (2009), comparing SAD (n=85) with controls (n=285) during a speech and a conversation task. There was no significant difference between groups in heart rate reactivity during the speech ($d = 0.17$) or the conversation ($d = 0.15$). However, adolescents with SAD rated themselves as more physiologically aroused on the BAI during both the speech ($d = 0.81$) and the conversation task ($d = 0.65$). In a community sample of 136 9 to 17 year olds, high

and low socially anxious participants were compared on self-reported and objective measures of heart rate and sweating during a speech task (Miers, Blote, Sumter, Kallen, & Westenberg, 2011). High social anxiety participants reported a higher heart rate and sweatier palms (d = 0.52) but no differences in heart rate or skin conductance levels were found.

In summary, the three studies agree in their finding that whilst socially anxious adolescents and controls are comparable on indices of objective arousal, the socially anxious group consistently overestimate their bodily symptoms of anxiety (Siess, Blechert, & Schmitz, 2014). It could be argued that these results are in line with the cognitive model because when socially anxious adolescents overestimate their physical sensations this may lead them to overestimate how anxious they *look*. However, studies in which adolescents are also asked how they think they appear are needed in order to directly test the hypothesis.

2.3.3. Use of safety behaviours

In adults, studies have found that socially anxious adults use safety behaviours more in social situations than those who are not socially anxious (e.g. Cuming et al. (2009); Pinto-Gouveia, Cunha, and do Céu Salvador (2003)). We also have robust experimental data pointing to the causal role that these safety behaviours play in social anxiety in adults (e.g., McManus et al. (2009); McManus, Sacadura, and Clark (2008)). The data in relation to safety behaviours in children is scant (Halldorsson & Creswell, 2017), but four studies have addressed the question in adolescents and they find similar results to in adults.

In the questionnaire study of Hodson et al. (2008), adolescents completed a self-report measure of safety behavior use, the Safety Behaviour Questionnaire (Clark, 2003). High social anxiety adolescents endorsed a greater use of safety behaviours compared to

middle (d = 0.65) and low (d = 1.01) scorers, who did not differ from each other (d = 0.32). Safety behavior use was significantly associated with social anxiety across the whole sample (d = 0.94), but it did not emerge as a unique predictor of social anxiety. In line with this study, Schreiber et al. (2012), using the same measure of safety behaviours (translated into German) found that high socially anxious 14 to 20 year olds used safety behaviours more than low socially anxious youth (d = 1.34). In contrast to the study of Hodson et al. (2008), they did find that across the whole sample safety behavior use was a significant independent predictor of social anxiety but not of depression. Ranta et al. (2014) asked unselected adolescents about the safety behaviours they had used when they had felt socially anxious. 17% of the whole sample reported using at least one safety behavior when they felt socially anxious. Safety behaviours were more frequent in the high social anxiety group compared to the low group (d = 0.68), and amongst those with a clinical or subclinical diagnosis of SAD compared to without (r = 0.63). The fourth study was undertaken by Thomas and colleagues (2012). Adolescents referred to a clinic with possible social anxiety and community controls completed a measure of safety behaviours developed with adults, the SAFE (Cuming et al., 2009), and a measure of social anxiety. In line with hypotheses, social anxiety was positively correlated with safety behaviour use across the whole sample, and the socially anxious group endorsed significantly greater safety behaviour use than the community controls.

In summary, four studies have looked at safety behaviours in adolescent social anxiety. A medium to large effect was found. Unfortunately, all the studies were correlational. Studies modulating the use of safety behaviours and examining the effect (on, for example, anxiety, cognitions, self-focus, and social performance) will be important in order to test the hypothesis that these behaviours are causally implicated in social anxiety. Due to the sensitized peer environment during adolescence we would expect

avoidance safety behaviours to result in particularly negative reactions from their peers, and so socially anxious adolescents will be susceptible to becoming locked into a vicious cycle and subjected to peer victimization, which we know is especially common in adolescents (Troop-Gordon, 2017). Experimental studies will be valuable here. Furthermore, there are as yet no studies examining the putative sub-types of safety behaviours, their effects amongst adolescents, or developmental influences on the use of safety behaviours. For example, it is conceivable that there may be a developmental progression in young people's use of safety behaviours. As children move into and through adolescence, they may become increasingly sophisticated in their use of safety behaviours, for example moving from a reliance on avoidance behaviours towards increasing adoption of impression management behaviours.

The notion of safety behaviours provides a different perspective on the understanding of the inhibited or withdrawn behaviours of people who are socially anxious. Traditionally these behaviours have been interpreted as a sign that the individual lacks social skills (Wong & Rapee, 2015). However, treated adults do not show ongoing social skills deficits (for a review see Hofmann (2007)). When individuals are not anxious, they do not show deficits in social skills. Any deficits in performance seem to be largely restricted to situations in which they are anxious, which suggests that they are an anxiety response rather than an indication of a lack of knowledge or ability (Alden & Taylor, 2004). It seems likely that the apparent social skills deficits are in fact the observable safety behaviours (and the avoidance behaviours in particular).

Turning to studies with young people, in pre-adolescents a recent review concluded that there is evidence for an association between social anxiety disorder and a skills deficit (Halldorsson & Creswell, 2017). In adolescents, a number of studies have found that peers rate socially anxious youth as less socially skilled than non-anxious peers (e.g. Miers,

Blöte, and Westenberg (2011, 2010)). However, as highlighted by Wong and Rapee (2015), it is not possible to determine the direction of causality from these studies. Further, none of these studies have considered the contaminating effect of safety behaviours on social skills. As such, it is difficult to draw conclusions from the available studies about whether there is a latent skills deficit. It will be important to test whether in adolescents, as in adults, the apparent performance deficits can in fact be explained by observable safety behaviours. Indeed, it seems plausible that if, as we suggest, socially anxious younger people do rely on avoidance safety behaviours more than impression management strategies, they may present as even more withdrawn and inhibited than socially anxious adults. As such, a performance deficit account could be drawn upon more readily with this population, despite the absence of an extant deficit. It will be important to test this hypothesis, as it has implications for our understanding of the maintenance of social anxiety and for treatment.

2.3.4. Pre and post event processing

Pre-event processing. Worry is a feature of all anxiety disorders, and the cognitive model predicts that it is an important maintenance process in social anxiety as well. Examining this hypothesis, the questionnaire studies of Hodson et al. (2008) and Schreiber et al. (2012) both used a single item from the Social Phobia Weekly Summary Scale (Clark, 2003) to measure pre-event processing ('*over the past week, how often have you gone over in your mind things that you think might go wrong in a social situation before entering the situation*'). In the study by Hodson and colleagues (2008), high socially anxious youth reported worrying before social situations more than middle (d = 0.86) and low (d = 0.86) social anxiety groups, who did not differ from each other (d = 0.18). Across the whole sample, pre-event processing was significantly associated with social anxiety (r = 0.44)

but also to depression (r = 0.42). It was a significant independent predictor of depression but not of social anxiety. This suggests that the process may not be specific to social anxiety, which is unsurprising given that repetitive thinking processes are implicated in a range of common mental health disorders (Watkins, 2008). Schreiber et al. (2012) also found that high socially anxious youth reported more anticipatory worry than low scorers (d = 0.84). Again, consistent with the findings of Hodson and colleagues (2008), pre-event processing was found to be an independent predictor of depression but not social anxiety in regression analyses. A correlational study of 60 adolescents with an anxiety disorder diagnosis (Rabner, Mian, Langer, Comer, & Pincus, 2017) found a significant correlation between self-reported social anxiety symptoms and worry (r = 0.432), as measured by the Penn State Worry Questionnaire (Chorpita, Tracey, Brown, Collica, & Barlow, 1997).

Studies examining the related idea of anticipated performance criticism are relevant here. A recent study of anticipated audience criticism (Ranta et al., 2014) tested the hypothesis that socially anxious adolescents tend to expect more negative audience reactions in non-threatening situations compared to their peers. Amongst 333 adolescents scoring in the top and bottom quartile of the SAS-A, their hypothesis was confirmed: socially anxious youth demonstrated a tendency to expect negative classmate reactions (measured by self-report questionnaire) when they were the presenter (r = 0.60). There were no differences in expectations between anxiety groups when participants were asked to imagine an anxious peer rather than themselves, or in positive expectations of reactions. Similarly, in a study by Blote et al. (2014), social anxiety was associated with more negative expectations of performance before a speech task (r = 0.32). Likewise, asked to rate expectations of their performance in a videotaped role-play task, high socially anxious young adolescents thought they would perform worse than low scorers (d = 0.51; Morgan and Banerjee (2006)). Erath, Flanagan, and Bierman (2007) asked 42 high socially anxious

and 42 average anxiety adolescents to undertake a videotaped conversation task with a young adult. Higher social anxiety was significantly correlated with expectations of poorer social performance ($r = 0.27$). In addition, negative social performance expectations predicted skill deficits in the conversation task ($r = 0.25$).

In summary, the findings are all consistent with the cognitive model: pre-event processing involves a focus on potential negative outcomes of a social situation and an anticipation of social failure. These negative expectations will increase the likelihood that the situation is interpreted negatively, one's focus of attention shifts internally, and safety behaviours are utilized, thereby maintaining anxiety. However, although using a variety of methods, all of these were correlational studies with analogue samples.

Post-event processing. Rumination is in many respects a similar process to worry, and like worry it is implicated in a wide range of mental health difficulties (Watkins, 2008) including social anxiety. Only two studies have examined this process in adolescent social anxiety. Using comparable methodologies, both Hodson et al. (2008) and Schreiber et al. (2012) examined whether group differences in post-event processing could be identified amongst a stratified non-clinical sample. Both used the Post Event Processing Questionnaire (Rachman, Grüter-Andrew, & Shafran, 2000). It comprises 13 items related to how much the individual went over an event afterwards. Hodson et al. (2008) found that high socially anxious youth reported more post-event processing than middle ($d = 0.62$) or low ($d = 0.95$) groups (who did not differ from each other ($d = 0.30$). Post-event processing was significantly associated with social anxiety across the whole sample ($r = 0.40$) and with depression ($r = 0.28$). It was also a significant independent predictor of social anxiety. In the study of Schreiber et al. (2012) high socially anxious youth endorsed more post-event processing than low scorers ($d = 0.94$). In regression analysis, post-event

processing was not a significant independent predictor of social anxiety, but it was of depression.

In summary, only two studies have looked at the role of post-event processing in adolescent social anxiety. Whilst both indicate that the process is elevated in adolescents with higher levels of social anxiety (with a medium effect), they were questionnaire studies with analogue samples, limiting the conclusions that we can draw.

2.4. Discussion

Reviewing the studies undertaken with adolescent samples we see that there is encouraging support for the hypotheses derived from the cognitive model of Clark and Wells (1995). However, as yet the majority of studies have been undertaken with analogue samples, typically comparing extreme scorers on a measure of social anxiety. This is generally considered to be a valid research strategy given that social anxiety is thought to vary continuously across the population (Stopa & Clark, 2001) but it will be important to replicate the findings with adolescent clinical samples. Another critical limitation of the studies is that the majority of them have been correlational. As such the resultant findings provide promising support for the hypotheses but the directionality of effects cannot be inferred. To determine whether these processes actually maintain social anxiety, further experimental studies are needed in which the psychological processes of interest are manipulated and their effect on social anxiety observed.

CHAPTER 3. MODIFYING MENTAL IMAGERY IN ADOLESCENT SOCIAL ANXIETY: AN EXPERIMENTAL STUDY.

A version of this chapter has been published in PLOSONE (see Appendix):
Leigh, E., Chiu, K., & Clark, D.M. (2020). The effects of modifying mental imagery in adolescent social anxiety. *PLOSONE, 15*(4), doi: 10.1371/journal.pone.0230826.

3.1. Introduction

The systematic review described in Chapter 2 highlighted the need for experimental studies including valid manipulations of imagery in order to test a central hypothesis of the Clark and Wells model: that negative self-imagery plays a causal role in adolescent social anxiety.

As noted in Chapter 2, one experimental study manipulating self-imagery in adolescents has been undertaken (Alfano et al., 2008). In this study, adolescents with SAD and healthy controls took part in videotaped role-play and read-aloud tasks and then rated their anxiety and performance. An independent assessor also rated their performance. Half of the control participants were instructed to engage in negative self-imagery during the tasks. The other half of the control group and the SAD group received no instructions for the tasks. The SAD group was rated as more anxious and less competent, whilst minimal differences were found between the control groups. Whilst this could be because negative self-imagery is a consequence rather than a cause of social anxiety, design issues could also explain the findings. The control group was not clearly defined; those control participants who received no instructions were not asked about the content or nature of their thoughts during the experimental task. In addition, individuals in the control group had low symptoms of social anxiety and therefore they are unlikely to experience negative

self-imagery in social settings with any frequency. As a result, it is likely that they would have found it difficult to generate and maintain negative self-images. With this study I addressed this issue by selecting a group of adolescents with high social anxiety, then experimentally manipulated spontaneously occurring self-imagery. This provides a more robust test of the hypothesis that negative self-imagery is causally implicated in adolescent social anxiety. If in this population, we also fail to observe differences that are seen in the adult population then it would suggest that the mechanisms underlying social anxiety may be different in adolescents and adults. In the study, I examined the perceived and actual effects of negative self-imagery compared to benign self-imagery during a conversation task using a within-subjects design. Three sources of outcome data were compared: self-report, conversation partner-report, and independent assessor ratings.

3.2. Methods

3.2.1. Ethical Approvals and Consent/Assent Procedures

The study received ethical approval from the University of Oxford Medical Sciences Division Ethics Committee (CUREC Reference: R54283/RE001; see Appendix). Written parental consent and written young person assent were obtained for participation in the study.

3.2.2. Sample Size Estimation

Power analysis was conducted *a priori* with reference to two studies that used similar experimental designs, one with a sample of socially anxious undergraduates and one with a clinical adult sample (Hirsch et al., 2004; Hirsch et al., 2003). The calculation estimated that in order to detect a difference between the imagery conditions with $p < .05$ and 80% power, 30 participants or more were required to test the probability of rejecting the null

hypothesis when it is false. We increased the sample size to n = 34 given the differences in population.

3.2.3. Recruitment Procedure

Participants were recruited via a screening program undertaken in two secondary schools. All pupils in UK school years 7-9 (aged 11-14 years) were invited to take part. 13% of the pupils who participated in the screening procedure were eligible for free school meals and for 13% English was not their first language. These figures were the same as the proportions for the schools as a whole. The figures are a little lower than the national average in England (15.9% of secondary school pupils in England eligible for free school meals in 2019/2020; 17.1% of secondary school pupils in England have English as a second language; UK Statistics Authority, 2018). As part of the screening they completed a measure of social anxiety (the self-report version of the Liebowitz Social Anxiety Scale for Children and Adolescents, LSAS-CA-SR (Masia-Warner et al., 1999)). Pupils who scored in the top quartile of the distribution of scores for their year group on the LSAS-CA-SR were invited to take part. The LSAS-CA-SR was repeated at the experimental testing session, and any participant whose score had changed such that they were no longer scoring within the upper quartile for their year group were not included ($n = 0$).

3.2.4. Design

High socially anxious participants had two conversations with a naïve conversation partner (gender-matched with participants). In one condition they held a negative self-image in mind and in the other they held a benign self-image in mind. The order of imagery condition was counterbalanced across participants. After each conversation, participants rated their anxiety and how well they thought they performed and completed manipulation

checks. They also completed questionnaires assessing safety behaviour use and observable aspects of behaviour. Conversation partners rated participants' performance and their own anxiety after each interaction. Participants and conversation partners also both completed a questionnaire assessing the quality of the conversation. The conversations were videotaped and an independent assessor blind to the study aims and experimental manipulation rated the interaction on the conversation quality questionnaire.

3.2.5. Participants

Participants. 34 young people, 22 of whom were female, served as the experimental participants. Their average age was 13.55 (SD = 0.88), ranging from 11.85 to 14.79 years. The average total score on the LSAS-CA-SR was 71.03 (SD = 27.57), ranging from 21 to 116. The mean score on the Short Mood and Feelings Questionnaire (SMFQ; Angold et al. (1995)) was 9.91 (SD = 5.58), ranging from 2 to 22.

Conversation Partners. Six psychology students (50% female) served as the conversation partners. It was explained to them that they were helping with a psychology study about adolescents, but they were naïve to the specific study aims and manipulation. Their average age was 22 years (*SD* = 3.36; range = 16-24), and the average LSAS score (Liebowitz, 1987) was 26 (*SD* = 12.01; range = 11-39).

3.2.6. Manipulation of imagery

Each participant generated two images: one that they typically experienced in socially anxious situations (the 'negative' image) and the other that they experienced when they felt relaxed or less anxious (the 'benign' image). The procedure to generate the images was the same as that reported by Hirsch et al. (2004; 2003), based on Hackmann et al.

(2000). Minor adaptations were made and piloted to ensure the instructions were appropriate for adolescents. The procedure involved two stages: a situation was identified and then the associated image was elicited. For the negative image condition, participants recalled a social situation when they had felt anxious, and for the benign image they recalled a social situation when they had felt relaxed. Once the situation had been identified, the associated image was elicited by asking participants a series of questions about how they felt they looked and sounded, felt, and how they came across to others in the situation.

3.2.7. Materials

Social anxiety symptoms were measured with the self-report version of the 24 item Liebowitz Social Anxiety Scale for Children and Adolescents, LSAS-CA-SR (Masia-Warner et al., 1999), which ranges from 0 to 144 (with higher scores indicating more social anxiety symptoms). Internal consistency in the current study was high (Cronbach's $\alpha = .95$). See Chapter 5 for details of validation of the self-report version of the measure.

Depression symptoms were measured with the short form of the Mood and Feelings Questionnaire (SMFQ (Angold et al., 1995)). The SMFQ is a 13-item self-report questionnaire assessing different aspects of depressive symptoms in children and adolescents, such as '*I cried a lot'*. Each item ranges from 0 (not true) to 2 (true). Total scores were obtained by summing up all the items. This scale has good reliability and validity (Turner, Joinson, Peters, Wiles, & Lewis, 2014; Angold et al., 1995). Internal consistency in the present sample was high (Cronbach's $\alpha = .86$).

Three visual analogue scale (VAS) ratings were included as *Manipulation Checks.* Participants were asked to rate: how able they were to hold the image in mind during the conversation (range = 0-100); the clarity of the image (range = 0-100); and the valence of the image (from -3, totally negative, to +3, totally positive).

Anxiety and Performance Ratings were made after each conversation on VAS. Participants were asked to rate how anxious they felt and how anxious they thought they appeared (from 0 'not at all anxious' to 100 'very severely anxious'). Lastly, they were asked how well the conversation went overall (from 0 'not at all well' to 100 'really well').

Sixteen items assessing safety behaviour use were taken from the *Child and Adolescent Social Behaviour Questionnaire* (CASBQ; Evans, Chiu, Clark, Waite, and Leigh (2021); Chiu, Clark, and Leigh (2021a)). For this study, each item was scored on a 9-point scale ranging from 0-8 ('not at all' to 'extremely'). Participants completed these 16 items twice during the study, once after each conversation. They were asked to make their ratings based on what they had done during the preceding conversation only. As well as a total Safety Behaviour Use score (16 items; Cronbach's $\alpha = .93$), in line with Hirsch et al. (2004), an Avoidance Safety Behaviour Use score (10 items; Cronbach's $\alpha = .89$) and an Impression Management Safety Behaviour Use score (6 items; Cronbach's $\alpha = .89$) were also calculated.

The self-report version of the *Behaviour Questionnaire* developed by Hirsch et al. (2004) was completed after each conversation. The questionnaire measures observable aspects of behaviour, with higher scores indicating more observable anxiety and poorer performance. Total scores (Cronbach's $\alpha = .91$) and subscales for specific negative (Cronbach's $\alpha =$

.81), global negative behaviours (Cronbach's α = .83) and positive behaviours (Cronbach's α = .83) were calculated.

Conversation Partner Ratings were obtained after each conversation on the following scales: how anxious the participant appeared (from 0 'not at all anxious' to 100 'very anxious'); how enjoyable the conversation was (from 0 'not at all enjoyable' to 100 'extremely enjoyable'); how likeable they found the participant (-50 'less likeable than average' to +50 'more likeable than average'); and the conversation partner's own anxiety (from 0 'not at all anxious' to 100 'very anxious').

The 12-item *Conversation Questionnaire* was completed by both participant and conversation partner after each conversation. It was developed by Hirsch et al (2004) and assesses various aspects of the conversation, such as flow, pauses, and reciprocity. Higher scores indicate a more critical evaluation of the conversation (Self-report Cronbach's α = .86; Conversation partner Cronbach's α = .88; Independent rater Cronbach's α = .94). An independent rater (psychology graduate) also scored the conversations on the *Conversation Questionnaire*, modified for observer rating (e.g., *'I interrupted the conversation partner'* changed to '*The participant interrupted the conversation partner'*). The rater demonstrated excellent interrater reliability on a subsample of 50% of the videos rated by the lead author (*ICC* = .95), and the internal consistency of the scale was high (α = .95).

3.2.8. Procedure

Testing took place in school during school hours. Before beginning, it was explained to conversation partners that they would be taking part in brief conversations with young people. They were asked to imagine that they were meeting them for the first time at a

family party or social event. They were instructed not to talk about the experiment during the conversation. Participants initially completed the LSAS-CA-SR and the SMFQ. They were allocated to 'Negative - Benign' or 'Benign - Negative' imagery conditions in counterbalanced order. They then underwent the manipulation (see *Manipulation of imagery* for details). Participants were asked to continue following the instructions during the conversation with the conversation partner whom they had not met before. Participants were given a conversation topic (either 'Entertainment' or 'Holidays', these were assigned in counterbalanced order within conditions). The conversation partner was unaware of the study design. The conversation partner was also given the conversation topic. The participant and stooge were introduced to one another, and the experimenter sat discreetly in the room during the conversation. Each conversation lasted 5 minutes. After each conversation, participants completed *Manipulation Checks, Anxiety and Performance Ratings, CASBQ Items*, *Behaviour Questionnaire,* and *Conversation Questionnaire.* The conversation partner completed *Conversation Partner Ratings* and *Conversation Questionnaire.* At the end of the session participants were thanked for their time and debriefed.

3.2.9. Data Analysis

To compare the effects of negative and benign imagery on self-report ratings, MANOVA were undertaken, with one within-subjects factor (Condition: Negative and Benign) and one between-subjects factor (Order: Negative-Benign and Benign- Negative).

To examine the extent to which participants overestimated how anxious they looked, we calculated a difference score (self-reported anxious appearance minus conversation partner reported anxious appearance) in the negative and benign imagery conditions and compared these in an ANOVA.

To examine whether there were observable effects of negative compared to benign imagery, MANOVA were undertaken on conversation partner ratings, with one within-subjects factor (Condition: Negative vs. Benign) and one between-subjects factor (Order: Negative-Benign vs. Benign- Negative). To examine the effects of negative and benign imagery on Conversation Questionnaire ratings, a 3-way ANOVA was run, which included Rater as a within-subjects factor (Participant vs. Conversation Partner vs. Observer), as well as Condition and Order factors.

All MANOVA and ANOVA were run with Topic Order as a further between-subjects variable (Holidays – Entertainment vs. Entertainment – Holidays). No main effects or interactions were significant and therefore analyses are reported without the inclusion of this factor.

To examine the hypothesis that the detrimental effect of negative imagery on participants' social performance is due to avoidant safety behaviours, we undertook exploratory mediation analyses of the effect of negative (vs. benign) imagery on conversation partner-rated and observer-rated conversation quality, with avoidant and impression management safety behaviours as separate mediators.

3.3. Results

3.3.1. Manipulation Checks

Table 3.1. summarises means and standard deviations and test statistics. MANOVA revealed no significant main effects or interactions for clarity of the image, or ability to hold the image in mind, suggesting participants rated themselves as able to comply with instructions equally well in both conditions. As expected, there was a main effect of condition on the valence of the image, with more negative images reported in the negative imagery condition. No other main effects or interactions were significant.

Table 3.1. Means and standard deviations for outcome variables in the negative and the benign imagery conditions, with test statistic and estimate of the effect size for this contrast

Measure	Condition		Test Statistic	*p* value	Partial eta^2 (η_p^2)
	Negative Imagery M [SD]	Neutral Imagery M [SD]			
Manipulation Checks					
Held image in mind (0 - 100)	69.71 [21.67]	73.24 [19.61]	$F(1, 32) = 0.53$	.47	0.02
Valence (-3 - +3)	-1.60 [0.95]	2.09 [0.61]	$F(1, 32) = 292.89$	< .001	0.90
Clarity (0 - 100)	60.44 [24.07]	59.41 [22.01]	$F(1, 32) = 0.04$	.85	0.00
Self-Report Anxiety and Performance Ratings					
Feel anxious (0 - 100)	65.44 [16.44]	26.32 [16.98]	$F(1, 32) = 155.94$	< .01	0.83
Look anxious (0 - 100)	70.15 [18.57]	32.65 [20.24]	$F(1, 32) = 102.73$	< .01	0.76
How well the conversation went (0 - 100)	48.53 [21.59]	76.24 [18.08]	$F(1, 32) = 57.37$	< .01	0.64
Overestimation of Anxious Appearance	16.03 [32.14]	-1.03 [27.57]	F(1, 32) = 15.10	< .01	0.32
Behaviour Questionnaire					
Total Score	65.06 [18.22]	31.44 [16.05]			
Global Negative Behaviour	28.32 [7.79]	13.56 [7.31]	$F(1, 32) = 155.32$	< .01	0.83
Specific Negative Behaviour	14.53 [6.97]	6.97 [5.84]	$F(1, 32) = 68.45$	< .01	0.68
Positive Behaviour	22.21 [7.26]	10.91 [5.77]	$F(1, 32) = 104.97$	< .01	0.77
Safety Behaviour Questionnaire					
Total	69.24 [22.67]	45.71 [21.59]	$F(1, 32) = 105.01$	< .01	0.77
Avoidance Behaviours	41.50 [15.23]	24.12 [13.71]	$F(1, 32) = 98.18$	< .01	0.75

Impression Management	27.74 [9.56]	21.59 [9.36]	$F(1, 32) = 36.02$	< .01	0.53
Conversation Partner Ratings					
Enjoyed conversation (0 - 100)	43.24 [22.22]	63.68 [20.35]	$F(1, 32) = 26.04$	< .01	0.45
Participant looked anxious (0 - 100)	54.12 [26.04]	33.68 [24.00]	$F(1, 32) = 28.31$	< .01	0.47
Liked the participant (-50 - +50)	2.50 [18.84]	15.88 [19.36]	$F(1, 32) = 29.17$	< .01	0.48
Own feelings of anxiety (0 - 100)	27.50 [23.72]	20.00 [18.22]	$F(1, 32) = 8.50$	< .01	0.21
Wanted to continue conversation (0 - 100)	40.88 [22.34]	62.06 [23.71]	$F(1, 32) = 28.37$	< .01	0.47
Conversation Questionnaire Ratings					
Participant Rater	45.19 [13.10]	26.90 [11.22]			
Conversation Partner Rater	45.26 [13.52]	32.90 [15.99]	see text		
Independent Rater	34.32 [20.43]	21.84 [14.39]			

NOTES: M = mean; SD = standard deviation. Multivariate tests revealed the only significant effect was Condition, therefore results of the univariate tests for this contrast only are presented.

3.3.2. Self-Report Ratings

Means and standard deviations are shown in Table 3.1. There was a main effect of condition across all Anxiety and Performance Ratings, with participants rating themselves as feeling and looking less anxious and coming across better in the benign imagery condition. There was a significant main effect of condition on the Behaviour Questionnaire, with more critical ratings in the negative imagery condition, for the total and subtotal scores. Participants reported using significantly more safety behaviours (total and subtypes) in the negative imagery condition. No other effects were significant.

3.3.3. Overestimation of Anxious Appearance

ANOVA revealed a significant main effect of condition, with participants overestimating how anxious they appeared more when holding a negative image in mind compared to a benign image (see Table 3.1.). No other main effects or interactions were significant.

3.3.4. Conversation Partner Ratings

There was a significant main effect of condition on all Conversation Partner Ratings, see Table 3.1., with more critical ratings in the negative compared to the benign condition. No other effects were significant.

3.3.5. Conversation Quality Questionnaire (Self, Conversation Partner, and Observer Rated)

Three-way ANOVA revealed a main effect of condition ($F(1, 32) = 41.69$, $p < .01$, $\eta_p^2 = .57$), with the conversation rated more negatively for the negative compared to the benign imagery condition by participants (see Table 3.1. for means and standard deviations). No other effects were significant.

3.3.6. Mediation Analysis

Exploratory mediation analyses were undertaken to examine the effect of negative (vs. benign) imagery (Y) on conversation partner-rated and observer-rated conversation quality (X), with avoidant and impression management safety behaviours as separate mediators (M). The direct, indirect, and total effects were estimated using the MEMORE macro for SPSS (Montoya & Hayes, 2017). The magnitude and 95% confidence intervals of the indirect effects were estimated (using 5000 bootstrap resamples, with replacement). Significance of the indirect effect was indicated by the 95% confidence interval not crossing zero.

In line with the hypotheses, the indirect (mediation) effect for the Avoidance subscale of the ASBQ was significant (bootstrap coefficient = 10.58, *SE* = 4.13), and the 95% confidence interval ranged from 2.52 to 18.91, for the conversation partner rated conversation questionnaire, and also for the observer rated conversation questionnaire (bootstrap coefficient = 1.02, *SE* = 0.46, [95% CI: 0.05, 1.88]). Also in line with hypotheses, the indirect (mediation) effect for the Impression Management subscale of the ASBQ was not significant for either the partner (bootstrap coefficient = 1.27, *SE* = 2.43, [95% CI: -2.93, 6.90]), or the observer rated conversation questionnaire (bootstrap coefficient = 0.22, *SE* = 0.30, [95% CI: -0.26, 0.90]).

3.4. Discussion

Identifying cognitive processes that maintain adolescent social anxiety and that are modifiable is important because it provides a route to optimising treatments. Negative self-imagery, that we know is causally implicated in adult social anxiety, is one such candidate process. However, as described in Chapter 2, whilst previous research with adolescents has

demonstrated that negative self-imagery is associated with social anxiety, the only experimental study undertaken in adolescents reported no effect of manipulating imagery in healthy volunteers (Alfano et al., 2008). I was interested to examine whether this is because negative self-imagery operates differently in adolescents compared to adults, or whether the null finding is related to design issues. Therefore, in Study 1 I experimentally manipulated self-imagery in high socially anxious adolescents. Holding a negative image in mind did have a detrimental effect across self-report, conversation partner, and independent assessor ratings. The findings provide the first direct evidence that negative self-imagery is causally implicated in social anxiety in adolescents as it is in adults, rather than being an epiphenomenon or consequence.

High socially anxious adolescents reported feeling more anxious when holding a negative self-image in mind compared to a benign image. They also thought that they came across worse and that the conversation was less successful, for example, that there were more pauses and it flowed less well. Participants thought that they looked more anxious, with higher ratings of observable aspects of anxiety, such as fidgeting and blushing, when holding a negative image in mind.

The findings suggest that the more critical self-judgements associated with holding a negative compared to a benign image in mind are a result of distorted perception and also partly based in reality. The extent to which participants have a distorted perception of how they come across can be measured by comparing self and conversation partner ratings of anxious appearance. When adolescents hold a negative image in mind, they overestimate how anxious they look. This is in contrast to the fairly accurate assessment they make of their anxious appearance when holding a benign image in mind. The present data suggests that the use of internal information, such as negative self-imagery, is associated with this distortion when holding a negative image in mind. It raises the question of whether

socially anxious adolescents use other internal information to infer how they come across, in addition to self-imagery. For example, there is evidence to suggest that socially anxious adults use physical sensations of anxiety to (over) estimate how anxious they look (Mansell & Clark, 1999). This hypothesis has not yet been tested in adolescents.

There is also some reality to participants' critical self-judgements. Conversation partners and the independent observer, naïve to the study design, also rated the conversation more critically when the participant held a negative image in mind. They rated the conversation as less reciprocal, interesting and enjoyable, and conversation partners rated the participant as looking more anxious. As images are internal events, it may seem surprising that they influence the way our behaviour is rated by other people. How could self-imagery affect observable behaviour? It could be that participants felt much more anxious in the negative image condition and the visible effects of anxiety affected the whole interaction. Another possibility is that it is due to the contaminating effect of safety behaviours, and avoidant safety behaviours in particular. Indeed, in the negative imagery condition, participants reported using more safety behaviours in general compared to the benign imagery condition, despite no instructions to do so, and so it seems that negative self-imagery motivates the spontaneous use of safety behaviours in socially anxious adolescents.

It may be that the increase in safety behaviour use, and avoidant safety behaviours in particular, impacts on how other people experience the conversation. Preliminary mediation analysis suggests that this may be the case: avoidant but not impression management safety behaviours mediated the relationship between negative imagery and both conversation partner and observer ratings of the conversation quality. By way of example, a socially anxious adolescent who stands on the edge of the group, avoiding eye contact and declining to ask any questions for fear of stumbling over their words and

appearing stupid, may be perceived more critically by others. This is a sad irony, because this is the opposite message that they are trying to convey. However, it is important to note that the sample size was substantially lower than what is considered optimal for mediation analysis (MacKinnon, Fairchild, & Fritz, 2007). Therefore, this finding could be a false positive and replication with a larger sample size is needed. I suggested in Chapter 1 that adolescents may rely more heavily on avoidant safety behaviours rather than impression management strategies, compared to adults (Leigh & Clark, 2018). If this were borne out in future studies, then it would suggest that socially anxious adolescents are particularly vulnerable to becoming caught in vicious cycles of anxiety, safety behaviour use, and peer rejection.

Importantly, the manipulation used in the study appears to be robust. Participants were able to hold a clear and vivid image in mind throughout the task, with no differences between conditions except for valence of the image, as intended. These ratings suggest that adolescents (at least those aged 11-14 years), like adults, are able to generate an image of themselves and hold this in mind, but also that the valence can be explicitly manipulated. Extending beyond this study, future research examining if and how the relationship between imagery and social anxiety changes during the course of childhood and adolescence will be important, given that competence in mental imagery (i.e. in the ability to generate, inspect, maintain and manipulate images (Kosslyn, Thompson, & Ganis, 2006)), is likely to develop over the course of this period (Burnett Heyes, Lau, & Holmes, 2013).

3.4.1. Limitations

The study is not without its limitations. Whilst the study was adequately powered, the sample size was modest. In addition, I note that conversation partners were on average

nine years older than participants, which may limit generalisability to an extent, and future studies with similar-aged peers as conversation partners would be valuable. For example, it may be that other adolescents, who as a group are typically sensitive to social reward and rejection, may be more affected by social anxiety-related avoidant behaviours than adults. Furthermore, baseline ratings of anxiety and related self-report measures were not gathered. It would be interesting to chart whether changes from baseline across time may have differed between conditions. Although the sample was not drawn from a clinical population, participants' average score on a measure of social anxiety (LSAS-CA-SR) was high (M = 71.03 [SD = 27.57]) and the participant with the lowest LSAS-CA-SR scored 21 (and the next lowest LSAS-CA-SR score was 30), which is only marginally below the suggested threshold (22.5) for distinguishing adolescents with social phobia and healthy controls (Masia-Warner et al., 2003).

3.4.2. Conclusions

The present study has yielded consistent findings pointing to the detrimental effect of negative imagery on social anxiety for adolescents which are relevant to clinical interventions for socially anxious adolescents. Techniques to target negative imagery may be beneficial, for example the use of video feedback to correct distorted images is a core technique in cognitive therapy for social anxiety in adults, e.g. Clark et al. (2003), and shows promise for adolescents (Leigh, Creswell, et al., 2021; Leigh & Clark, 2016; Ingul et al., 2014). Specific support for the use of this technique with adolescents came from a study by Parr and Cartwright-Hatton (2009). Compared to a control condition, they demonstrated that video feedback with careful verbal preparation (see also Warnock-Parkes et al. (2017)) led to reductions in anxiety and more positive predictions amongst socially anxious teenagers.

CHAPTER 4. SELF-FOCUSED ATTENTION AND SAFETY BEHAVIOURS MAINTAIN ADOLESCENT SOCIAL ANXIETY: AN EXPERIMENTAL STUDY.

A version of this chapter has been published in *PLOSONE* (see Appendix):
Leigh, E., Chiu, K., & Clark, D.M. Self-focused attention and safety behaviours maintain social anxiety in adolescents: an experimental study. *PLOS ONE 16*(2): e0247703, doi: 10.1371/journal.pone.0247703.

4.1. Introduction

In the systematic review described in Chapter 2, the lack of well-controlled experimental studies examining the role of self-focused attention and safety behaviours in the maintenance of adolescent social anxiety was highlighted.

The small number of correlational studies examining the association between the two candidate processes and social anxiety symptoms that were identified in the systematic review suggest that self-focused attention and safety behaviours co-vary with adolescent social anxiety. However, experimental studies are needed in order to comprehensively test the hypothesis that varying self-focused attention and safety behaviours causes changes in social anxiety. As yet no studies have been undertaken with adolescents. With adults, a number of experimental studies that have manipulated these variables have provided support for the causal role of self-focused attention and safety behaviours in adults (see Piccirillo et al. (2016) and Norton and Abbott (2016) for reviews of safety behaviours and self-focused attention, respectively). Two studies manipulated self-focused attention and safety behaviours simultaneously. In the first study with a sample of adults drawn from an analogue population, McManus, Sacadura, & Clark (2008) demonstrated that

experimentally manipulating self-focus and safety behaviour use during a conversation task modulated participants' experience of anxiety and appraisals of their performance, as well as affecting how the participant objectively came across to others. The second study evaluated the effects of this experimental manipulation with a clinical sample of adults as part of cognitive therapy treatment (McManus et al., 2009). Patients felt more anxious, thought they appeared more anxious, and came across worse when they focused on themselves and used safety behaviours. This consistent finding was used in subsequent therapy sessions to encourage patients to shift to a more external focus of attention in everyday social interactions and to drop their safety behaviours in order to more effectively test their anxiety provoking expectations.

Here, I describe an experimental study manipulating self-focus and safety behaviours during a conversation task in high and low socially anxious youth. The effects on self-reported anxiety and performance, conversation-partner ratings, and independent assessor ratings are examined. I tested three main hypotheses in the study: first, that self-focus and safety behaviours would increase feelings and appearance of anxiety; second, that the detrimental effects of safety behaviours and self-focus would be evident in both high and low socially anxious adolescents, because the safety behaviours employed are typical of those with SAD (Ranta et al., 2014); and third, that self-focus and safety behaviours would undermine performance, as reflected in more critical judgements by conversation partners and independent observers.

4.2. Methods

4.2.1. Ethical Approvals and Consent/Assent Procedures

The study received ethical approval from the University of Oxford Medical Sciences Division Ethics Committee (CUREC Reference: R54283/RE001, see Appendix). Written

parental consent and written young person assent were obtained for participation in the study.

4.2.2. Sample Size Estimation

Power analysis was conducted *a priori* with reference to a study with adults that used a similar experimental design (McManus et al., 2008). In order to detect a difference between the two conditions with $p < .05$ and 80% power, 21 participants or more were required to test the probability of rejecting the null hypothesis when it is false. The sample size was increased to n = 28 per group given the differences in population (i.e., we sought to recruit a total sample size of 56).

4.2.3. Recruitment Procedure

Participants were recruited via a screening program undertaken in two secondary schools. All pupils in school years 7-9 (11-14 y) were invited to take part. 13% of the pupils who participated in the screening procedure were eligible for free school meals and for 13% English was not their first language. These figures were the same as the proportions for the schools as a whole. The figures are a little lower than the national average in England (15.9% of secondary school pupils in England eligible for free school meals in 2019/2020; 17.1% of secondary school pupils in England have English as a second language; UK Statistics Authority, 2018). As part of the screening they completed a measure of social anxiety (the self-report version of the Liebowitz Social Anxiety Scale for Children and Adolescents, LSAS-CA-SR; Masia-Warner et al. (1999)). Those pupils whose scores on the LSAS-CA-SR fell in the top or bottom quartile of the distribution of scores for their year group were invited to take part. The LSAS-CA-SR was repeated at the experimental

testing session, and any participant whose score had changed such that they were no longer scoring within their allocated quartile for their year group were not included (n = 0).

4.2.4. Design

High and low socially anxious (SA) participants had two conversations with a naïve conversation partner (gender-matched with participants). In one condition they were instructed to use an agreed set of common safety behaviours and focus on themselves and in the other to focus externally and not use these safety behaviours. The order of condition was counterbalanced within groups and the order of conversation topic was counterbalanced within condition within group. Participants rated their anxiety and how well they thought they performed and completed manipulation checks after each conversation. Conversation partners rated the participants' performance, the conversation, and their own anxiety. The conversations were also videotaped, and independent assessors rated the interaction.

4.2.5. Experimental Participants

Table 4.1. provides summary statistics for the high (n = 28) and low (n = 29) SA groups and the total sample. The average age of the sample was 12.75 years (SD=0.75), with no differences between groups. The number of females and males was comparable. As would be expected, the high SA group endorsed significantly higher social anxiety (LSAS-CA-SR) and depression (SMFQ) scores. Their average use of safety behaviours (CASBQ) was significantly higher, and they reported being more self-focused (SPWSS item) in social situations.

4.2.6. Conversation Partners

10 psychology students (50% female) served as the conversation partners. It was explained to them that they were helping with a psychology study about adolescence, but they were naïve to the specific study aims and manipulation. Their average age was 20.50 years (SD: 3.17; range: 16-24), and the average LSAS score was 31.80 (SD: 15.37; range: 3 - 48).

Table 4.1. Descriptive statistics of participants.

	High Anxiety N=28 M [SD]	Low Anxiety N=29 M [SD]	Total N=57 M [SD]	Statistical Test *t* test
Age (y)	12.88 [0.76]	12.64 [0.73]	12.75 [0.75]	$t(55)=-1.24$, $p=0.22$
LSAS-CA-SR Anxiety[1]	38.46 [14.36]	4.29 [3.80]	21.38 [20.14]	$t(54)=-12.17$, $p<0.001$
LSAS-CA-SR Avoidance[1]	36.32 [14.93]	5.04 [4.34]	20.68 [19.18]	$t(54)=-10.64$, $p<0.001$
LSAS-CA-SR Total[1]	74.79 [28.44]	9.32 [6.90]	42.05 [38.88]	$t(54)=-11.84$, $p<0.001$
SMFQ Total[1]	10.61 [6.68]	2.11 [1.91]	6.36 [6.49]	$t(54)=-6.47$, $p<0.001$
CASBQ[1]	1.42 [0.42]	0.74 [0.44]	1.05 [0.55]	$t(47)=-5.55$, $p<0.001$
SPWSS Item[1]	4.15 [2.28]	3.00 [1.66]	3.57 [2.06]	$t(52)=-2.21$, $p<0.05$
	N	N	N	χ^2 Test
Gender (F)	18	18	36	$\chi^2(1)=0.30$, $p=0.86$

NOTES: M = mean; SD = standard deviation; LSAS-CA-SR = Liebowitz Social Anxiety Scale for Children & Adolescents – Self-Report Version; SMFQ = Short Mood & Feelings Questionnaire; CASBQ = Child & Adolescent Social Behaviour Questionnaire; SPWSS = Social Phobia Weekly Summary Scale. [1]N=56 for LSAS-CA-SR and SMFQ (High =28, Low =28); N=50 for CASBQ (High = 23, Low = 27); N=54 for SPWSS item (High = 27, Low = 27).

4.2.7. Manipulation of self-focused attention and safety behaviours

The instructions for the self-focus and safety behaviours manipulation were consistent with those used in the study of McManus, Sacadura, & Clark (2008). Minor adaptations were made to ensure they were appropriate for adolescents, and these were piloted with N=5. For the 'With' self-focus and safety behaviours condition they were as follows:

"*Focus on yourself and watch yourself during this conversation. Think about how you are coming across to the other person. And because you are really thinking about how you are coming across, we also want you to be careful about what you say, thinking about whether it is the right thing to say. And check on that as you go along, deciding whether it is good enough to say before you say it.*". The instructions for the 'Without' self-focus and safety behaviours condition were: "*Focus on the other person. Don't think about yourself or how you're coming across. Just be your natural self and respond to whatever the other person says without thinking about that. Say whatever comes to mind. Absorb yourself in the conversation, focusing on the other person. As if it is the most interesting conversation you have ever had*."

4.2.8. Materials

Social anxiety symptoms were measured with the self-report version of the 24 item Liebowitz Social Anxiety Scale for Children and Adolescents, LSAS-CA-SR (Masia et al., 1999). Internal consistency in the current study was high (Cronbach's $\alpha = .95$). See Chapter 5 for details of the self-report version of the measure.

Depression symptoms were measured using the Short Mood and Feelings Questionnaire (*SMFQ*) (Angold et al., 1995). Internal consistency in the present study was high (Cronbach's $\alpha = 0.93$).

Child & Adolescent Social Behaviour Questionnaire (CASBQ) is a 29-item scale of common social safety behaviours (Evans, Chiu, et al., 2021). Respondents are asked how often they tend to use each safety behaviour in social situations when they feel anxious on a 4-point scale (range: 0-3) and a mean score is calculated. This was included to examine

whether there were group differences in habitual safety behaviour use. Internal consistency was good in the present study (Cronbach's $\alpha = 0.74$).

One item was taken from the *Social Phobia Weekly Summary Scale (SPWSS*; (Clark, 2003)) assessing self-focused attention in difficult social situations (range: 0-8). This was included to examine whether there were group differences in habitual use of self-focused attention in social situations.

Manipulation Checks were made with two single item visual analogue scales (VAS). To assess the degree of self-focus, participants were asked to rate '*How focused were you on yourself (and how you were coming across) or on the conversation and the other person/people?*' after each conversation, from -3 ('totally self-focused') to +3 ('totally focused on the outside'). Participants were also asked to rate the extent to which they had been able to follow the instructions, from 0 (not at all) to 100 (totally).

Anxiety and Performance Ratings were made after each conversation on VAS. Participants were asked to rate how anxious they felt and how anxious they thought they appeared (from 0 'not at all anxious' to 100 'very severely anxious'). Before the first conversation, participants were asked what their worst fear was for the conversation. After each conversation, they were asked to rate how much they believed their negative prediction to have occurred (from 0 'not at all' to 100 'totally'). They were asked how well the conversation went overall (from 0 'not at all well' to 100 'really well). Lastly, they were also asked whether or not they had experienced a negative image of how they came across (yes/no).

Conversation Partner Ratings were obtained after each conversation on the following scales: how anxious the participant appeared (from 0 'not at all anxious' to 100 'very anxious'); how enjoyable the conversation was (from 0 'not at all enjoyable' to 100 'extremely enjoyable'); and how likeable they found the participant (-50 'less likeable than average' to +50 'more likeable than average').

Independent observer ratings of performance were made on a modified version of the Conversation Questionnaire (Hirsch et al., 2004). The questionnaire assesses various aspects of the conversation, such as flow, pauses, and reciprocity, and higher scores indicate a more critical evaluation of the conversation. Minor adaptations were made for use in the present study, to account for an independent rater rather than a conversation partner rater (e.g., '*I interrupted the other person*' was changed to '*The participant interrupted the other person*.'). Items are rated from 0 ('not at all') to 8 ('extremely'). One psychology graduate blind to the condition rated all recorded interactions. The rater demonstrated excellent interrater reliability on a subsample of 50% of the videos rated by the lead author (*ICC* = .95, 95% CI: .93-.96).

4.2.9. Procedure

Testing took place in school hours. Before beginning, it was explained to conversation partners that they would be taking part in brief conversations with young people. They were asked to imagine that they were meeting them for the first time at a family party or social event. They were instructed not to talk about the experiment during the conversation. It was explained to participants that they were participating in a study to find out how young people think and feel in social situations. Participants initially completed the self-report questionnaires. Participants were allocated to the 'With' self-focused

attention and safety behaviours or 'Without' in counterbalanced order within groups. Prior to the first conversation, participants were asked to identify their worst fears for a conversation with a stranger and what safety behaviours they would normally use to avoid these feared outcomes. They then underwent the self-focused attention and safety behaviour manipulation. Participants were asked to continue following the instructions throughout the following conversation with the conversation partner whom they had not met before. Participants were given a conversation topic (either 'Hobbies' or 'Holidays', these were assigned in counterbalanced order within conditions within groups). The conversation partner, who was unaware of the study design, was also given the conversation topic. The participant and conversation partner were introduced to one another, and the experimenter sat discreetly in the room during the conversation. Each conversation lasted 5 minutes. After each conversation, participants completed *Manipulation Check* items, *Anxiety and Performance Ratings* and the conversation partner completed *Conversation Partner Ratings.* At the end of the session participants were thanked for their time and debriefed.

4.2.10. Data analysis

A series of linear mixed models was conducted on the self-report, conversation-partner report, and independent assessor ratings. Condition and group were included as fixed factors, and the interaction between condition and group. Conversation partner was included as a random effect. To test for possible condition order effects, all models were first run with this variable included as a fixed factor, with the two- and three-way interactions. The covariance structure matrix was unstructured, and Maximum Likelihood was used for model estimation. All analyses were conducted using R (R Core Team, 2020). Significance was considered at $p < .05$, two-tailed.

4.3. Results

4.3.1. Descriptive statistics

Means and standard deviations for the variables included in the following analysis are presented in Table 4.2.

Table 4.2. Means and standard deviations for the high and low social anxiety groups in the 'With' and 'Without' conditions.

Measure	Social Anxiety Group	Condition	
		With safety behaviours and self-focus (N=57) M (SD)	Without safety behaviours and self-focus (N=57) M (SD)
Manipulation Checks			
Self-focus (-3 – +3)			
	Low	-0.47 (0.88)	1.78 (1.18)
	High	-1.45 (1.23)	0.66 (1.27)
Followed instructions (0 – 100)			
	Low	58.21 (21.16)	82.86 (15.88)
	High	65.36 (21.17)	60.00 (18.81)
Participant Anxiety and Performance Ratings			
Feel anxious (0 – 100)			
	Low	35.69 (21.46)	10.48 (12.00)
	High	66.61 (16.50)	41.79 (23.26)
Look anxious (0 – 100)			
	Low	43.45 (24.06)	11.55 (15.55)
	High	64.11 (18.76)	39.82 (21.58)
Belief (0 – 100)			
	Low	23.55 (25.57)	9.14 (16.26)
	High	57.14 (28.46)	32.68 (24.66)
How well the conversation went (0 – 100)			
	Low	61.83 (23.94)	83.59 (12.34)
	High	43.21 (22.29)	55.89 (18.91)
Perceiver Ratings			
Participant looked anxious (0 – 100)			
	Low	45.17 (26.41)	28.97 (23.35)
	High	67.50 (28.63)	50.36 (27.01)

Enjoyed conversation (0 – 100)			
	Low	67.24 (21.20)	76.90 (15.83)
	High	49.64 (25.46)	64.29 (23.32)
Liked the participant (-50 – +50)			
	Low	19.14 (16.48)	26.21 (12.65)
	High	11.07 (16.85)	17.50 (16.24)
Observer Ratings			
Conversation Questionnaire (0 – 96)			
	Low	20.16 (13.64)	9.89 (10.62)
	High	40.24 (16.69)	24.33 (13.93)

NOTES: M = mean; SD = standard deviation.

4.3.2. Linear Mixed-Effects Models Analyses[2]

Manipulation Checks

As shown in Table 4.3., participants were more self-focused in the 'With' condition, as intended. High, compared to low, socially anxious participants were more self-focused in general. Participants were more able to follow instructions in the 'Without' condition, and there was a significant interaction effect between condition and group. Post-hoc Tukey HSD tests showed that low socially anxious adolescents reported following the instructions more in the 'Without' condition than in the 'With' condition ($p < .001$). There were no significant differences in compliance for high socially anxious adolescents between conditions ($p = .69$). The high socially anxious adolescents reported significantly lower compliance in the 'Without' condition ($p < .001$) compared to the low socially anxious participants.

Table 4.3. Effects of experimental condition and social anxiety group on manipulation checks

	Self-focus			Followed instructions		
Predictors	*b*	CI	*p*-value	*b*	CI	*p*-value

[2] Results of linear mixed models excluding condition order are presented because no significant order effects or interactions were observed.

Intercept	-0.36	-0.62 – -0.10	0.007	-0.41	-0.79 – -0.02	0.037
Condition	1.35	1.00 – 1.70	<0.001	1.15	0.71 – 1.58	<0.001
Group	-0.60	-0.96 – -0.24	0.001	0.27	-0.19 – 0.73	0.248
Condition x Group	-0.08	-0.58 – 0.42	0.753	-1.40	-2.02 – -0.77	<0.001
Random Effects						
σ^2	0.47			0.72		
τ_{00}	0.01 $_{PerceiverID}$			0.11 $_{PerceiverID}$		
ICC	0.02			0.13		
N	11 $_{PerceiverID}$			11 $_{PerceiverID}$		
Observations	114			114		
Marginal R^2 / Conditional R^2	0.528 / 0.539			0.212 / 0.315		

NOTES: CI = 95% confidence interval; Marginal R^2 = variance explained by random and fixed effects; Conditional R^2 = variance explained by fixed effects; Perceiver ID = Conversation partner ID

Self-Report Anxiety and Performance Ratings

Table 4.4. shows that there was a main effect of condition across all anxiety and appraisal ratings, with participants in the 'With' condition feeling more anxious, believing they appeared more anxious, believing more strongly their feared prediction had occurred, and thinking they did less well. There was also a main effect of group across all the ratings, with high socially anxious adolescents feeling more anxious and believing they appeared more anxious, believing more strongly that their feared prediction had come true, and thinking that they had come across less well. No interaction effects were significant.

After each conversation, participants were asked whether they had experienced a negative self-image. In the 'With' condition, 17/28 (61%) of the high social anxiety group and 11/29 (38%) of the low social anxiety group experienced a negative image. In the 'Without' condition, 4/28 (14%) and 0/29 (0%) of the high and low groups, respectively, reported a negative image. McNemar's test indicated that significantly more negative images were experienced in the 'With' compared to the 'Without' condition ($p < .001$).

Table 4.4. Linear mixed model results for self-report ratings

	Felt anxious			Looked anxious			Belief			How well the conversation went		
Predictors	*b*	CI	*p*-value	*b*	CI	*p*-value	*b*	CI	*p*-value	*b*	CI	*p*-value
Intercept	-0.08	-0.35 – 0.18	0.527	0.17	-0.14 – 0.48	0.281	-0.25	-0.56 – 0.07	0.126	-0.02	-0.37 – 0.34	0.916
Condition	-0.92	-1.27 – -0.57	<0.001	-1.16	-1.53 – -0.80	<0.001	-0.49	-0.90 – -0.07	0.021	0.89	0.50 – 1.28	<0.001
Group	1.12	0.76 – 1.48	<0.001	0.73	0.35 – 1.11	<0.001	1.14	0.72 – 1.57	<0.001	-0.69	-1.10 – -0.28	0.001
Condition x Group	0.01	-0.48 – 0.51	0.956	0.28	-0.24 – 0.80	0.294	-0.34	-0.93 – 0.25	0.258	-0.37	-0.93 – 0.19	0.192
Random Effects												
σ^2	0.46			0.50			0.64			0.58		
τ_{00}	0.02 $_{\text{PerceiverID}}$			0.06 $_{\text{PerceiverID}}$			0.03 $_{\text{PerceiverID}}$			0.11 $_{\text{PerceiverID}}$		
ICC	0.03			0.11			0.04			0.16		
N	11 $_{\text{PerceiverID}}$			11 $_{\text{PerceiverID}}$			11 $_{\text{PerceiverID}}$			11 $_{\text{PerceiverID}}$		
Observations	114			114			114			114		
Marginal R^2 / Conditional R^2	0.528 / 0.543			0.451 / 0.512			0.346 / 0.373			0.324 / 0.434		

NOTES: CI = 95% confidence interval; Marginal R^2 = variance explained by random and fixed effects; Conditional R^2 = variance explained by fixed effects; Perceiver ID = Conversation partner ID

Conversation Partner Ratings

Table 4.5. shows that there was a main effect of condition on two of the three of the conversation partner report ratings, with conversation partners rating participants in the 'Without' condition as looking less anxious and more likeable than those in the 'With' condition. The effect of condition on how enjoyable conversation partners rated the interaction was approaching significance (p = .077). There was a main effect of group across all the ratings, with conversation partners rating high socially anxious participants as looking more anxious, less likeable, and the conversation as less enjoyable. No other main effects or interaction effects were significant.

Table 4.5. Linear mixed model results for conversation partner ratings

	Participant looked anxious			Enjoyed conversation			Liked participant		
Predictors	*b*	CI	*p*-value	*b*	CI	*p*-value	*b*	CI	*p*-value
Intercept	-0.08	-0.44 – 0.27	0.648	0.04	-0.33 – 0.42	0.824	-0.07	-0.51 – 0.36	0.742
Condition	-0.55	-1.00 – -0.10	0.016	0.41	-0.04 – 0.86	0.077	0.43	0.01 – 0.85	0.043
Group	0.82	0.35 – 1.28	0.001	-0.78	-1.25 – -0.30	0.001	-0.56	-1.00 – -0.11	0.014
Condition x Group	-0.03	-0.67 – 0.61	0.922	0.21	-0.44 – 0.86	0.522	-0.04	-0.64 – 0.56	0.898
Random Effects									
σ^2	0.76			0.78			0.66		
τ_{00}	0.05 $_{PerceiverID}$			0.08 $_{PerceiverID}$			0.26 $_{PerceiverID}$		
ICC	0.06			0.09			0.28		
N	11 $_{PerceiverID}$			11 $_{PerceiverID}$			11 $_{PerceiverID}$		
Observations	114			114			114		
Marginal R^2 / Conditional R^2	0.230 / 0.280			0.176 / 0.250			0.122 / 0.367		

NOTES: CI = 95% confidence interval; Marginal R^2 = variance explained by random and fixed effects; Conditional R^2 = variance explained by fixed effects; Perceiver ID = Conversation partner ID

Observer ratings

Table 4.6. presents findings from the linear mixed models for observer ratings. Conversations were rated more critically in the 'With' condition compared to the 'Without' condition. There was also a main effect of group on observer ratings, with high socially anxious adolescents receiving more critical ratings than low socially anxious adolescents. The interaction effect was statistically non-significant.

Table 4.6. Linear mixed model results for observer ratings

	Conversation questionnaire		
Predictors	*b*	CI	*p*-value
Intercept	-0.25	-0.64 – 0.14	0.211
Condition	-0.58	-1.08 – -0.08	0.023
Group	1.14	0.64 – 1.65	<0.001
Condition x Group	-0.32	-1.01 – 0.36	0.357
Random Effects			
σ^2	0.60		
$\tau_{00\ PerceiverID}$	0.04		
ICC	0.06		
$N_{\ PerceiverID}$	8		
Observations	79		
Marginal R^2 / Conditional R^2	0.377 / 0.416		

NOTES: CI = 95% confidence interval; Marginal R^2 = variance explained by random and fixed effects; Conditional R^2 = variance explained by fixed effects; Perceiver ID = Conversation partner ID

4.4. Discussion

The findings of Study 3 are consistent with the hypothesis that self-focused attention and safety behaviours are relevant to the maintenance of adolescent social anxiety. Participants felt more anxious and thought they looked more anxious in the 'With' compared to the 'Without' condition. They also thought they came across worse and that their negative predictions were more likely to have occurred. To a certain extent their fears were realised, in that the conversation partner and the independent observer rated them more critically, in terms of looking more anxious and being less likeable, when self-focused and using safety behaviours.

It is interesting to note that the detrimental effects of self-focus and safety behaviours were observed in both high and low anxiety groups. The finding indicates that focusing on oneself and using safety behaviours in social situations is unhelpful for adolescents in general, whether or not they are socially anxious. However, when we compare ratings of safety behaviour use and self-focus in social situations day-to-day, significant group differences were observed. It therefore seems that whilst using safety behaviours and focusing internally is unhelpful for all adolescents, young people who are more socially anxious tend to use them more in everyday life, and so this will mean that the adverse effects will only manifest for this population. Extending from this observation is the question of why some individuals adopt these psychological processes more than others. Longitudinal studies examining the temporal associations between negative social beliefs and safety behaviours and self-focused attention could test the hypothesis put forward by cognitive accounts of social anxiety that it is negative social schema that motivate the use of safety behaviours and self-focus (e.g., Rapee and Heimberg (1997)).

The findings provide evidence for mechanisms of adolescent social anxiety: safety behaviours and self-focus. We cannot draw conclusions about the extent to which effects

are driven by self-focused attention and/or the use of safety behaviours, because both processes were manipulated together. This is because in reality it is difficult to conceive of an individual using common safety behaviours such as monitoring how they are coming across and rehearsing what they are going to say *without* focusing on themselves. Whilst it is difficult to manipulate safety behaviours without manipulating self-focus, future studies that examine the effect of manipulating focus of attention only during a social interaction task would be useful. This limitation perhaps highlights the interconnectedness of the processes (Hirsch, Clark, & Mathews, 2006) emphasised in the dominant cognitive behavioural models of social anxiety in adults (e.g. Rapee and Heimberg (1997); Clark and Wells (1995)). Support for the idea that the processes are reciprocally related comes from both this study and Study 2. In Study 2 (described in Chapter 3; Leigh, Chiu, and Clark (2020)), I found that socially anxious adolescents reported a spontaneous increase in use of safety behaviours when engaging in negative mental imagery. Similarly, in the present study, participants were asked whether or not they had experienced an image or impression of how they came across during each conversation. Despite no instructions relating to mental imagery, almost half of all participants (49%) experienced a spontaneous negative image of how they looked when they were self-focused and using safety behaviours. One participant described an image of themselves as "*the weird kid sitting in the corner*", another as "*sweating, blushing, uptight, spoilt, posh*". This compares to only 7% (4/59) in the 'Without' condition. The finding aligns with the suggestion that self-focus increases awareness of internally generated information such as negative images and impressions (Hirsch et al., 2003).

4.4.1. Limitations

Participants were instructed to use a common set of safety behaviours, based on those used in the study of McManus et al (2008). However, according to cognitive accounts of social anxiety, safety behaviours are highly idiosyncratic to individuals and to their specific fears. As a result, we cannot conclude from our findings that the use of any safety behaviours is detrimental, but rather that the use of this particular set of safety behaviours is. However, the specific instructions that we used for the safety behaviour manipulation were based on safety behaviours that are particularly commonly reported by both socially anxious adults (Kocovski et al., 2016; McManus et al., 2009; McManus et al., 2008) and adolescents (Evans, Chiu, et al., 2021; Leigh & Clark, 2018; Thomas et al., 2012; Cuming et al., 2009). These safety behaviours are also strongly correlated with self-reported social anxiety in those samples when the correlations are based on naturalistic use (Evans, Chiu, et al., 2021; Schreiber et al., 2012; Hodson et al., 2008). In addition to this limitation, we note that conversation partners were on average eight years older than participants, which may limit generalisability of our findings to an extent, and future studies with similar-aged peers as conversation partners would be useful. Furthermore, single item measures are prone to random measurement error and so future studies could include multi-item measures.

Although the sample was not drawn from a clinical population, the average score of high social anxiety participants' on a measure of social anxiety (LSAS-CA-SR) was high (74.79 [28.44]) and the participant with the lowest LSAS-CA-SR scored 29, which is above the suggested threshold (22.5) for distinguishing adolescents with social phobia and healthy controls (Masia-Warner et al., 2003).

4.4.2. Conclusions

The findings of this study may well be pertinent to the task of developing therapeutic techniques for adolescents with SAD. Cognitive therapy for adult SAD (Clark et al., 2006), includes a *self-focused attention and safety behaviours experiment* similar to the one in this study in session 2 of the treatment. Therapists use it to help patients discover the unintended consequences of the processes. This demonstration is later followed by *attention retraining* to help patients reduce self-focus and become more externally focused in social situations; and *behavioural experiments* to help patients test out their predictions in feared situations whilst dropping their safety behaviours and focusing on other people and their reactions. Our results suggest that also incorporating the *self-focused attention and safety behaviours* experiment and linked procedures into CBT protocols for adolescent social anxiety may be beneficial. Consistent with this suggestion, three outcome studies that used versions of the adult cognitive therapy for SAD protocol with adolescents have shown promising results (Leigh, Creswell, et al., 2021; Leigh & Clark, 2016; Ingul et al., 2014).

This study indicates that the use of safety behaviours and self-focus in social situations is unhelpful. The processes are problematic in a number of ways, including increasing anxiety, maintaining negative self-perceptions, prompting negative mental imagery, and contaminating social performance. This is consistent with cognitive models of social anxiety in adults that suggest specific psychological processes (social cognitions, negative imagery, self-focused attention, and safety behaviours) create interlocking reciprocal links that lock individuals into a cycle of social anxiety. The study suggests that similar processes may operate in adolescents and point to potential opportunities for intervention.

CHAPTER 5. ESTABLISHING THE PSYCHOMETRIC PROPERTIES OF A SELF-REPORT MEASURE OF SOCIAL ANXIETY SYMPTOMS IN A GENERAL POPULATION ADOLESCENT SAMPLE.

A version of this chapter has been accepted for publication in the European Journal of Psychological Assessment (see Appendix):

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5.1. Introduction

In Chapter 1, I discussed the importance of quick, valid, and reliable questionnaires to facilitate early detection and guide the treatment of social anxiety disorder. The current study examines the psychometric properties of the self-report version of a commonly used measure of social anxiety, the Liebowitz Social Anxiety Scale for Children and Adolescents (LSAS-CA; Masia-Warner et al. (1999)) in a UK community sample of adolescents.

As described in Chapter 1, the 24-item semi-structured LSAS for children and adolescents (Masia-Warner et al., 1999) was found to have good internal consistency and convergent and divergent validity in a preliminary investigation (Masia-Warner et al., 2003). This study with 154 young people indicated a four-factor structure of the scale: social interaction anxiety and social interaction avoidance, performance anxiety and

performance avoidance. The scale was further examined by Storch and colleagues (2006) who also found evidence for good psychometric properties. However, in their study, the four-factor structure suggested by Masia-Warner et al (1999) was found to be a poor fit. Instead, their exploratory factor analysis indicated a two-factor solution, social interaction, and school performance, with higher-order factors for anxiety and avoidance ratings, provided a better fit to the data.

Latterly, a self-report version of the LSAS-CA has been examined in Spanish, French, and Hebrew speaking youth (Schmits et al., 2014; Shachar et al., 2014; Olivares et al., 2009), with good psychometric properties, including internal consistency and convergent validity, found for all three versions. Factor structures across the three studies differed, however. In their community study of French speaking adolescents, Schmits and colleagues (2014) found support for the four-factor solution proposed by Masia-Warner et al. (1999). In contrast, in an exploratory factor analysis, Olivares and colleagues (2009) suggested that two factors, representing anxiety and avoidance subscales, provided a better fit to the data than four factors in a Spanish community sample. Shacher et al (2014) also concluded a two-factor solution was best, however in their study with Israeli youth, the factors reflected social interaction and school performance, similar to the findings of Storch et al (2006) with the clinician-administered version.

It is noteworthy that neither the psychometric properties nor the factor structure of the English language version of the self-report LSAS-CA (LSAS-CA-SR) have been examined yet. The current study sought to bridge this gap. The study had two aims. The first aim was to examine the psychometric properties of the self-report version of the scale. In particular, I examined internal consistency and test-retest reliability. I was also interested in convergent and divergent validity. To examine this, I included a measure of depression and of broad anxiety symptoms, allowing comparison of the associations

between the LSAS-CA-SR and social anxiety symptom subscale of the anxiety measure with other anxiety subscales and with the measure of depression. The other aim was to determine the factor structure that exhibits the best fit in a UK community sample of adolescents. I tested three structural models. Model 1 is made up of four factors: Interaction Anxiety, Interaction Avoidance, Performance Anxiety and Performance Avoidance. This model was proposed by Masia-Warner et al. (2003) and further supported by the findings of Schmits et al. (2014). Model 2 is comprised of two factors, with Interaction Anxiety/Avoidance and Performance Anxiety/Avoidance (Storch et al., 2006). Model 3, comprised of two factors reflecting Anxiety and Avoidance, is reflective of the design of the questionnaire (with separate 'Anxiety' and 'Avoidance' rating scales) and was supported by the findings of Olivares et al. (2009). I then examined the measurement invariance of the optimal model across age and gender.

5.2. Method

5.2.1. Participants and Procedures

Data from two linked studies were included. Participants from the first sample were in UK school years 7-9 (aged 11-14 years), recruited from two non-selective and state-funded secondary schools in the UK. Participants completed a self-report questionnaire pack evaluating social anxiety, anxiety, and depression symptoms at time 1 (T1). At time 2 (T2), four to six months later, participants again completed the social anxiety measure to establish test-retest reliability. Participants from the second sample were recruited from years 12 and 13 (aged 16-18 years) of a sixth form college in the UK. Participants completed a self-report questionnaire pack evaluating social anxiety, anxiety, and depression symptoms at time 1 (T1) only. For Sample 1, all students in years 7-9 in the two participating schools were invited to participate. 718 students were invited to

participate, and the consent rate was 87.2%. 13% of the pupils in Sample 1 were eligible for free school meals and for 13% English was not their first language. These figures were consistent with the schools as a whole and with national statistics (UK Statistics Authority, 2018). For Sample 2, information about the number of students invited and socioeconomic status was not collected.

None of the participants had difficulty reading or understanding English. Of the 863 participants who completed baseline questionnaires at T1, 34 were excluded as they had not completed all items of the LSAS-CA-SR, and so the final sample consisted of 829 participants (Sample 1: n=626, average age: 12.95 [SD: 0.88], 52.5% female; and Sample 2: n=203, average age: 17.12 [SD: 0.72], 59.30% female). There were no differences in the proportion of males and females in the younger age group (Sample 1) compared to the older age group (Sample 2) ($\chi^2(1) = 2.46$, $p>.05$). 471 of participants from Sample 1 (75.24%) completed the LSAS-CA-SR at T2. The study procedures were in accordance with ethical standards and were approved by the Central University Research Ethics Committee at the University of Oxford (Reference number: R54283/RE001; Sample 1) and the Psychiatry, Nursing and Midwifery Research Ethics Subcommittee at King's College London (HR-18/19-8278; Sample 2). For participants under 16 years of age, written informed assent was obtained from all participants and opt-out consent was provided by participants' parents/guardians (Sample 1). For those aged 16 years and over, written informed consent was obtained from all participants (Sample 2).

5.2.2. Measures

The Liebowitz Social Anxiety Scale for Children and Adolescents-Self Report version (LSAS-CA-SR; Masia-Warner et al., 2003) is a 24-item self-report scale measuring social anxiety symptoms in young people aged 7-18 years old. This scale assesses levels of fear

and avoidance in interaction (e.g., '*Joining a conversation*') and performance situations (e.g., '*Answering a question in class*'). Each item has a 0-3 rating represented by 'none', 'mild', 'moderate' and 'severe' (for the anxiety ratings) and 'never', 'sometimes', 'often', 'usually' (for the avoidance ratings).

The Short Mood and Feelings Questionnaire (SMFQ; Angold et al., 1995) was used to measure depression symptoms. The internal consistency in this sample was $\alpha = .91$.

The child self-report version of the *Screen for Anxiety and Related Disorders* (SCARED; Birmaher et al. (1997)) is a 41-item questionnaire, with each item rated on a 3-point Likert scale. It is used to screen for childhood anxiety disorders including general anxiety disorder, separation anxiety disorder, panic disorder, social anxiety disorder, and school phobia in young people aged 8-18 years. The scale has good reliability and validity (Birmaher et al., 1999; Birmaher et al., 1997). Internal consistency of the total scale in this sample was $\alpha = .96$.

5.2.3. Data Analysis

Data was prepared in SPSS v. 26 and all analysis was conducted in R (R Core Team, 2020). Mean substitution was performed when less than 5% of items were missing in the SCARED and SMFQ questionnaires.

To test the structural models, confirmatory factor analysis was undertaken. For all the models, we allowed the residual variances of each paired anxiety-avoidance item to be correlated, in line with Schmits et al. (2014). This is done when two variables share something in common not captured by the latent variables. All 24 social and performance situations covered by the LSAS-CA-SR are rated for both anxiety and avoidance. For

example, participants rate how much anxiety '*Talking to classmates or others on the telephone*' (Item 1 of the scale) causes them *and* how much they avoid doing this. As a result, the measurement error of the anxiety items will be correlated with the measurement error of the avoidance items, and for this reason I allowed 24 correlated errors. The diagonally weighted least squares method was used to take into account the ordinal nature of the data (Li, 2016) in the models. To test the goodness of fit of each model, I examined the Standardized Root Mean Square Residual (SRMR), the Root Mean Square Error of Approximation (RMSEA), the Comparative Fit Index (CFI) and the Tucker Lewis Index (TLI). SRMR values below .08 and RMSEA values less than .06 indicate a good fit. CFI and TLI values greater than .90 suggest an acceptable fit and above .95 indicate a good fit. I also examined the Goodness of Fit Index (GFI), another absolute fit index, that is equivalent to the R^2. The GFI ranges from 0 to 1 with higher scores indicating a better fit (values > .90 are acceptable; Hooper, Coughlan, and Mullen (2008)). Finally, Chi-square difference tests were used to compare our models.

Once an optimal model was identified, I then examined measurement invariance across gender and across age, using a sequential constraint approach. The invariance of the factor structure was inspected in a series of nested models using multi-group confirmatory factor analysis. First, I examined configural invariance, which tests whether the factor structure is equal across groups, but factor loadings, intercepts and residual variances are allowed to differ (in other words, the basic model structure is invariant across groups). Second, metric invariance, whereby the factor structure and factor loadings are equal across groups, which means that the strengths of the associations between specific items and their respective underlying construct are the same across groups. Third, scalar invariance, whereby the loadings and intercepts are constrained to be equal across groups. This tests whether individuals who have the same score on the latent construct would

obtain the same score on the observed variable regardless of their group membership. Change in two fit indices, the CFI and RMSEA, was used to compare the three invariance models (i.e., configural vs. metric, metric vs. scalar). The more restrictive model was considered as valid when $\Delta CFI \leq 0.01$ (Chen, 2007; French & Finch, 2006; Cheung & Rensvold, 2002) and $\Delta RMSEA \leq .015$ (Chen, 2007). This series of steps was undertaken to examine gender invariance (with gender as the grouping variable) and then repeated for age invariance (with age group: younger (11-14 years) and older (16-18 years) as the grouping variable).

To examine internal consistency of the total score and also the subscales for the preferred model, I calculated Cronbach's alpha. Cronbach's alpha greater than .70 indicate acceptable consistency and above .80 good consistency (George & Mallery, 2016). Correlations between the LSAS-CA-SR total and SCARED subscales and the SMFQ were calculated and compared using the Fisher r-to-z transformation to examine convergent and divergent validity. To examine test-retest reliability, I calculated the intraclass coefficient using the two-way mixed-effects model with absolute agreement for single measurement (Koo & Li, 2016). Koo and colleagues (2016) suggest ICC values between .50 and .75 indicate moderate test-retest reliability, and above .75 indicate good reliability. Finally, I examined gender differences in LSAS-CA-SR total and subscale scores.

5.3. Results

5.3.1. Structural Validity

Table 5.1. provides the goodness of fit indices for the three models. Model 1, made up of 4 factors, was found to be an acceptable to good fit to the data. Model 2, made up of 2 factors (Interaction and Performance) was an acceptable fit to the data, but it was a significantly poorer fit to the data than Model 1 ($\Delta\chi2 = 218.97$, $\Delta df = 5$, $p < .001$). Model

3, made up of two factors (Anxiety and Avoidance), was also an acceptable fit to the data, but again, it was a significantly poorer fit to the data than Model 1 ($\Delta\chi 2 = 253.89$, $\Delta df = 5$, $p < .001$).

In sum, fit indices indicated Model 1 was a good fit to the data. Whilst Model 2 and 3 were also acceptable, model comparison indicated Model 1 was a better fit. Therefore, for the following analysis, the psychometric properties of the subscales based on structural Model 1 (Interaction Anxiety, Interaction Avoidance, Performance Anxiety, and Performance Avoidance), and the total score are examined.

Table 5.1. Fit indices for the three structural models tested

Model	Structure	Fit Index†						
		χ^2	df	SRMR	RMSEA (95% CI)	CFI	TLI	GFI
1	4-factor: Interaction Anxiety; Interaction Avoidance; Performance Anxiety; Performance Avoidance	3462.06	1050	.052	.052 (.050-.054)	.968	.966	.991
2	2 -factor: Interaction; Performance	4298.30	1055	.062	.060 (.058-.062)	.957	.954	.987
3	2 -factor: Anxiety; Avoidance	4128.15	1055	.057	.058 (.056-.060)	.959	.957	.988

NOTES: n = 614; df = degrees of freedom; SRMR = Standardized Root Mean Square Residual; RMSEA = Scaled Root Mean Square Error of Approximation; CFI = Scaled Comparative Fit Index; TLI = Scaled Tucker Lewis Index; GFI = Goodness of Fit Index. † Fit indices: for $\chi 2$ a lower value indicates a better fit to the data; for the other fit indices, acceptable values are considered to be: SRMR<.08; RMSEA<.06; CFI>.90; TLI>.90; GFI>.90

5.3.2. Multi-group confirmatory factor analysis

Gender: The multi-group confirmatory factor analysis displayed an adequate fit for the configure variance model: RMSEA = .049; CFI = .992; TLI = .992. The metric invariance model also showed an adequate fit according to goodness-of-fit indices (RMSEA = .053; CFI = .991; TLI = .990). The difference in CFI values between configural and metric invariance models was .001 and in RMSEA it was .004. The scalar invariance model also showed an acceptable fit (RMSEA = .051; CFI = .991; TLI = .992). The change in CFI from the metric invariance model was .001 and in RMSEA it was .003.

Age: The multi-group confirmatory factor analysis displayed an adequate fit for the configural variance model: RMSEA = .046; CFI = .994; TLI = .994. The metric invariance model also showed an adequate fit according to goodness-of-fit indices (RMSEA = .052; CFI = .992; TLI = .992). The difference in CFI values between configural and metric invariance models was .002 and in RMSEA it was .006. The scalar invariance model also showed an acceptable fit (RMSEA = .047; CFI = .993; TLI = .993), and a minimal change in CFI and RMSEA values from the metric invariance model (ΔCFI = .001; ΔRMSEA = .005).

5.3.3. Internal Consistency

Cronbach's alpha values ranged from .88 to .97 for the LSAS-CA-SR total and subtotals (see Table 5.2.), indicating that the total and all subtotals showed good internal consistency.

5.3.4. Correlations Among LSAS-CA-SR Total and Subtotals

Correlations between the LSAS-CA-SR total and subscales are presented in Table 5.3. All intercorrelations amongst subscale scores were large in magnitude (≥ .71), as were those between the total and subscale scores (≥ .91).

Table 5.2. Means and standard deviations and internal consistency and test-retest statistics for LSAS sub-scales.

LSAS-CA-CR Subscale	Female M (SD) (n = 443)	Male M (SD) (n = 374)	Total Sample M (SD) (n = 829‡)	*t*-test (df)	Cronbach α (95% CI)	ICC ° (95% CI)
Total	51.86 (32.04)	34.76 (24.35)	44.10 (30.11)	$t(815) = 8.46^{**}$	.97 (.96, .97)	.54 (.48, .59)
Interaction Anxiety	13.03 (8.98)	8.48 (7.07)	10.98 (8.51)	$t(829) = 8.00^{**}$	.92 (.91, .92)	.53 (.48, .59)
Interaction Avoidance	12.83 (8.46)	9.95 (6.97)	11.52 (7.94)	$t(822) = 5.27^{**}$	.88 (.87, .89)	.45 (.39, .51)
Performance Anxiety	13.29 (8.69)	7.63 (6.48)	10.72 (8.29)	$t(829) = 10.49^{**}$	.90 (.89, .91)	.57 (.51, .62)
Performance Avoidance	12.53 (8.59)	8.77 (6.82)	10.83 (8.06)	$t(822) = 6.86^{**}$	.87 (.86, .88)	.50 (.44, .55)

NOTES: M = mean; SD = standard deviation; df = degrees of freedom; CI = Confidence Interval; ICC = Intraclass correlation coefficient. * Indicates $p < .01$; ** indicates $p < .001$. ‡ n = 12 participants did not indicate their gender. ° n = 471 participants all from Sample 1.

5.3.5. Convergent and Divergent Validity

Bivariate correlations between the LSAS-CA-SR total and subscale scores, SMFQ total, and the subtotals of the SCARED questionnaire are presented in Table 5.3. The LSAS-CA-SR total and subscale scores showed significant positive correlations with all subscales of the SCARED and the SMFQ, as would be expected. However, they were highest with the social anxiety subscale. I examined this statistically with the Fisher's r-to-z transformation, which allows two correlations to be compared. The correlation between the LSAS-CA-SR total and the social anxiety subscale of the SCARED was compared

with the correlation between the LSAS-CA-SR total and each other subscale of the SCARED and the SMFQ. Consistent with what would be expected, the correlation between the LSAS-CA-SR total and the social anxiety subscale of the SCARED was significantly larger compared to that between the LSAS-CA-SR total and each of the other subscales of the SCARED and the SMFQ (all $p<.01$).

Table 5.3. Bivariate correlations of LSAS-CA-SR total and subscale scores, SMFQ, and SCARED subtotals.

	LSAS Total	Interaction Anxiety	Interaction Avoidance	Performance Anxiety	Performance Avoidance	Panic	Social	General	Separation	School	SMFQ
LSAS Total	1	0.93**	0.91**	0.93**	0.91**	0.64**	0.73**	0.69**	0.46**	0.57**	0.61**
Interaction Anxiety		1	0.83**	0.85**	0.71**	0.66**	0.76**	0.70***	0.46**	0.55**	0.60**
Interaction Avoidance			1	0.71**	0.79**	0.54**	0.69**	0.60**	0.42**	0.48**	0.51**
Performance Anxiety				1	0.83**	0.62**	0.68**	0.68**	0.42**	0.56**	0.60**
Performance Avoidance					1	0.51***	0.57**	0.55**	0.39**	0.50**	0.52**
Panic						1	0.65**	0.76**	0.60**	0.72**	0.74**
Social							1	0.73**	0.48**	0.55**	0.57***
General								1	0.55**	0.64**	0.77**
Separation									1	0.61**	0.49**
School										1	0.67**
SMFQ											1

NOTES: LSAS Total = LSAS-CA-SR Total score; Interaction Anxiety = LSAS-CA-SR Interaction Anxiety subscale score; Interaction Avoidance = LSAS-CA-SR Interaction Avoidance subscale score; Performance Anxiety = LSAS-CA-SR Performance Anxiety subscale score; Performance Avoidance = LSAS-CA-SR Performance Avoidance subscale score; Panic = Panic subscale of the SCARED; Social = Social anxiety subscale of the SCARED; General = Generalised anxiety subscale of the SCARED; Separation = Separation anxiety subscale of the SCARED; School = School avoidance subscale of the SCARED; SMFQ = Short Mood and Feelings Questionnaire.* indicates p <.01; ** indicates p<.001

5.3.6. Test-Retest Reliability

Test-retest reliability was conducted on the younger sample only (for whom data from two time points was available). The total LSAS-CA-SR demonstrated moderate but acceptable test-retest reliability, as shown in Table 5.2. I also computed the test-retest reliability for each of the four subscales. This was acceptable for the Interaction Anxiety, Performance Anxiety, and Performance Avoidance subscales, but lower for the Interaction Avoidance subscale.

5.3.7. Gender Differences

Table 5.2. presents the means and standard deviations for the total and subscale scores of the LSAS-CA-SR, for the group as a whole and split by gender. Independent *t*-tests revealed that girls scored significantly higher than boys on all measures ($p<.05$).

5.4. Discussion

This study examined the psychometric properties of the self-report English language version of the LSAS-CA, a widely used measure of social anxiety in young people. It provides preliminary support for the reliability and validity of the scale in a sample of UK adolescents.

I tested three potential models of the factor structure of the scale; that suggested by Masia-Warner and colleagues (2003), by Storch et al. (2006), and the model reflective of the design of the questionnaire. According to the fit indices, all three models were acceptable. However, fit indices were marginally better for the four-factor model suggested by Masia-Warner and colleagues, with interaction/performance and anxiety/avoidance components. Furthermore, model comparison also indicated that this model provided the best fit to the data.

I also examined the correlations amongst the subscale scores and correlations between subscale scores and external measures for further evidence for the utility of distinguishing the subscales. As one would expect, the associations amongst the subscales were all highly significant, and although they were higher than those reported in a general adolescent sample by Schmits et al (2014; range: .43 – .70), they were moderate to large in magnitude and lower than the intercorrelations reported by Masia-Warner et al (2003) in their sample of youth with SAD, other anxiety disorders, and healthy controls (range of *r*: .78 – .97). On examination of the associations between subscale scores and other measures, I observed similar findings to Masia-Warner and colleagues (2003), with regards associations of the subscales with other social anxiety measures. They reported larger associations between the Social Phobia Anxiety Inventory and the interaction subscales of the LSAS-CA compared to the performance subscales. I found a similar pattern of associations with the social anxiety subscale of the SCARED in our study. With regards correlations with other measures, somewhat stronger correlations were observed between the LSAS-CA anxiety subscales and subscales of the SCARED and the SMFQ compared to the avoidance subscales.

Taken together, the findings from the CFA suggest that the most valid approach to interpreting the LSAS-CA-SR is by inspecting subscales reflecting: interaction anxiety, interaction avoidance, performance anxiety, and performance avoidance. However, using total and total anxiety/avoidance subscales would also be a valid and useful approach to scoring, given the acceptability of all the models tested and the increased ease of calculating these indices. This may be a particular consideration if the scale is being used for the repeated assessment of social anxiety in a treatment trial. Interestingly, our findings closely align with those of Schmits and colleagues (2014). In their study of the French language self-report version of the scale, the authors concluded that the four factor

structure as suggested by Masia-Warner et al. (2003) was the optimal fit, but, as we found here, the two factor solutions were also acceptable.

I then examined measurement invariance of the scale across age group (young adolescents aged 11-14 years and older adolescents aged 16-18 years) and gender. Measurement invariance is an estimate of the extent to which respondents from different groups interpret the same measure in a conceptually similar way. Multigroup confirmatory factor analysis indicated that the optimal factor structure we identified in the CFA fitted both age groups and both genders well. Also, factor loadings and item intercepts appeared comparable across both ages and genders. These findings suggest that both young and old adolescents and boys and girls understand the measure in a similar way, and that the questionnaire can be compared across groups, with observed differences reflecting differences in the underlying constructs rather than measurement discrepancies. I note that stricter cut-offs have been proposed for comparing CFI between models to examine measurement invariance, for example, Meade, Johnson, and Braddy (2008) recommended a threshold of .002. However, others have argued this threshold is too conservative in real-world settings (Little, 2013), and I therefore decided to adopt the more widely used threshold of .01 (Chen, 2007; French & Finch, 2006; Cheung & Rensvold, 2002).

Psychometric properties of the scale were examined. Convergent and divergent validity was supported, with stronger correlations between the LSAS-CA-SR total and the social anxiety subscale of the SCARED than with the other subscales and the SMFQ. It therefore seems that, within our general population sample, the scale appears to be measuring a construct more similar to social anxiety than to other forms of anxiety or depression. The association between the scale and the generalised anxiety disorder subscale of the SCARED is large in magnitude, which is not surprising given the high comorbidity of the two types of anxiety. However, the correlation was still significantly

lower than it was with the social anxiety subscale. The internal consistency was good, suggesting that the items within the scale and subscales (based on the optimal model) measure aspects of the same construct. The present findings add to the body of evidence suggesting that the items within the scale and its subscales measure aspects of the same construct (Schmits et al., 2014; Olivares et al., 2009; Storch et al., 2006; Masia-Warner et al., 2003).

Test re-test reliability was investigated in a subset of the sample for whom we had available data. To our knowledge, this is the first time the test-retest reliability of the LSAS-CA-SR has been examined in any language. Whilst moderate test re-test reliability was found for the total and three out of four subscales, one of the subscales, interaction avoidance, showed poor test-retest reliability. It may therefore be most appropriate to inspect total scores rather than subscales over time. Finally, and as expected, gender differences were observed across the total and all subscale scores, with females endorsing higher scores. This is consistent with previous research (Asher & Aderka, 2018; MacKenzie & Fowler, 2013).

5.4.1. Limitations

The study has limitations. The sample was a general population sample. While this is perhaps ideal for establishing core psychometric properties, especially convergent and divergent validity, one would wish to know whether a similar factorial structure and other psychometric properties applied within a population that is restricted to clinical cases. Furthermore, future studies could examine the sensitivity to change of the scale and its discriminant validity. The study only included self-report measures. Greater confidence about the validity of the scale could be provided by establishing the patterns of association with measures reported by others, such as teachers/parents. The scale was developed for

children and adolescents, but the study was limited to an adolescent sample. Replication of the findings with a pre-adolescent sample would be valuable to inform the use of the scale with this population. Due to the lack of data about consent rate and socioeconomic status for Sample 2, I cannot be certain that there are not differences between the samples on these dimensions.

5.4.2. Conclusions

The study establishes the optimal factor structure, measurement invariance, and psychometric properties of the English-language self-report version of the LSAS-CA in a sample of UK adolescents. For clinicians and researchers, the LSAS-CA-SR could prove to be a useful tool because it is quick to complete, reliable and valid. The total score, rather than the four subscale scores, would appear to be the most appropriate measure for repeated assessment of social anxiety in a treatment trial.

CHAPTER 6. DEVELOPMENT AND PRELIMINARY VALIDATION OF THE CHILD & ADOLESCENT SOCIAL COGNITIONS QUESTIONNAIRE.

A version of this chapter has been published in *Child Psychiatry & Human Development* (see Appendix):

Leigh, E. & Clark, D.M. (2021). Development and Preliminary Validation of the Child & Adolescent Social Cognitions Questionnaire. *Child Psychiatry & Human Development*. doi: 10.1007/s10578-021-01163-0

6.1. Introduction

As described in Chapter 1, according to cognitive behavioural accounts of social anxiety, negative thoughts about oneself and others' reactions in social situations play a central role in the disorder (Heimberg et al., 2010; Hofmann, 2007; Rapee & Heimberg, 1997; Clark & Wells, 1995). If we are to extend our theoretical understanding of how these accounts apply to adolescents and we are to develop treatments for youth based on these models, valid and reliable measures of social anxiety related cognitions are needed.

Whilst two measures of social anxiety related cognitions have been developed for youth (the Child Automatic Thoughts Questionnaire (Schniering & Lyneham, 2007; Schniering & Rapee, 2002) and the Report of Youth Social Cognitions (Wong et al., 2018)), neither provides a measure of both 'in the moment', specific fears of how an individual will behave in a social situation (e.g., "*I will sweat*") as well as broader social-evaluative beliefs (e.g., "*I'm unlikeable"*). These cognitions are a central feature of cognitive behavioural models of social anxiety (Wong & Rapee, 2016) and a target for

therapies based on these models. In adults, the SCQ measures the full spectrum of these 'in the moment' cognitions, such as *"I will blush"*, as well as broader social-evaluative beliefs such as "*I am boring*", and it would be a useful tool to adapt for youth. In particular, it could improve our theoretical understanding of youth social anxiety and aid the delivery of psychological prevention and treatment approaches for SAD in young people.

With this study, I aimed to adapt the Social Cognitions Questionnaire (SCQ) for young people and provide a preliminary examination of its psychometric properties in a school-based sample of UK adolescents. The first aim was to examine the factor structure of the scale. The second aim was to determine preliminary psychometric properties of the scale, in particular internal consistency and construct validity. Construct validity was assessed by examining the associations between the adapted SCQ and scores on a measure of social anxiety, with and without controlling for depression and for generalised anxiety disorder (GAD) symptoms, both of which are strongly associated with social anxiety symptoms (Creswell, Waite, & Hudson, 2020). The third aim was to explore and compare scores on the adapted SCQ for older and younger adolescents and for males and females. This is because social anxiety symptoms are known to increase with age during adolescence (Westenberg, Gullone, Bokhorst, Heyne, & King, 2007) and to be higher amongst females than males (Asher & Aderka, 2018) and so we were interested to observe whether scores on the adapted SCQ showed similar gender- and age-related differences.

6.2. Method

6.2.1. Participants and Procedures

In total, 671 adolescents aged 11-18 years completed all items of the CASCQ as part of their participation in school-based studies of social anxiety in youth. Sample 1 comprised 482 young people in UK school years 7-9 recruited from two non-selective and state-

funded secondary schools (aged 11-14 years, mean age = 12.98, SD = 0.87, 248 [51.45%] female). Sample 2 comprised 189 young people in years 12 and 13 attending a sixth form college in the UK (aged 16-18 years, mean age = 17.11, SD = 0.72, 109 [57.67%] female).

Participants completed a self-report questionnaire pack, including the Social Cognitions Questionnaire adapted for children and adolescents (details below) and measures evaluating social anxiety, anxiety, and depression symptoms.

The study procedures were in accordance with ethical standards and were approved by the Central University Research Ethics Committee at the University of Oxford (Reference number: R54283/RE001for Sample 1) and the Psychiatry, Nursing and Midwifery Research Ethics Subcommittee at King's College London (HR-18/19-8278; Sample 2). For participants under 16 years of age, written informed assent was obtained from all participants and opt-out consent was provided by participants' parents/guardians. For participants aged 16 years and over, written informed consent was obtained from young people.

Before data collection, the research team explained the study to students during tutor time and information packs were distributed to caregivers and students. All students able to read and write English were encouraged to participate. Data collection took place during school time at least two weeks after information about the project had been disseminated. Participants completed a self-report questionnaire pack, including the Social Cognitions Questionnaire adapted for children and adolescents (details below) and measures evaluating social anxiety, anxiety, and depression symptoms. For Sample 1, all students in years 7-9 in the two participating schools were invited to participate. 718 students were

invited to participate, and the consent rate was 87.2%. 13% of the pupils in Sample 1 were eligible for free school meals and for 13% English was not their first language. These figures were the same as the proportions for the schools as a whole. The figures are a little lower than the national average in England (15.9% of secondary school pupils in England eligible for free school meals in 2019/2020; 17.1% of secondary school pupils in England have English as a second language; UK Statistics Authority, 2018). For Sample 2, information about the number of students invited and socioeconomic status was not collected. Of the total 865 participants who participated (n= 657 from Sample 1 and n= 208 from Sample 2), 671 had completed all items of the CASCQ. Those who had completed all items of the CASCQ were more likely to have been from Sample 2 (and therefore older) than Sample 1, compared to those who did not complete all items, but there no differences in gender, social anxiety symptoms, or depression symptoms.

6.2.2. Measures

Child & Adolescent Social Cognitions Questionnaire (CASCQ) is a self-report questionnaire, with each item corresponding to a common social anxiety-related cognition. All 22 items from the adult Social Cognitions Questionnaire (Wells et al., 1995) were included in the youth version, with wording adapted to be suitable for children and adolescents (e.g., *"I am inadequate"* was changed to *"I am not good enough"* and *"I am inferior"* was changed to *"I am not as good as others"*). In consultation with other youth mental health experts in the field (Professor Cathy Creswell and Dr Polly Waite, University of Oxford), six additional items were added which were considered to be relevant to young people ("*People will be angry with me*"; "*I will embarrass myself"; "I will get picked on and teased"; "I will look stupid"; "People will laugh at me"; "I will be forced to do things I don't want to do"*). A sample of five young people who had recovered

from SAD after treatment reviewed the items (original and revised, and the additional items) and rated each one from 0-5 on how understandable they were. Revisions improved ratings of all items. The pool of 28 items were all rated 4/5 or 5/5.

In the present study, participants were asked to rate how frequently they experience the thought when they are socially anxious, from 1 (never) to 5 (every time), and how much they believe the thought when it occurs, from 0 (not at all) to 100 (totally). Two scores are generated: a mean frequency score and mean belief score.

The Liebowitz Social Anxiety Scale for Children and Adolescents-Self Report version (LSAS-CA-SR; Masia-Warner et al., 2003) is a scale measuring social anxiety in young people (see Chapter 5). The internal consistency in the current sample was .97.

The Short Mood and Feelings Questionnaire (SMFQ; Angold et al., 1995) is a measure of depression in young people. The internal consistency in this sample was $\alpha = .91$.

The GAD subscale of the child version of the *Screen for Anxiety and Related Disorders* (SCARED; Birmaher et al. (1997)) was used to examine validity in the present study. The scale has good reliability and validity (Birmaher et al., 1999; Birmaher et al., 1997). Internal consistency in this sample was $\alpha = .96$.

6.2.3. Data analysis

Data was prepared in SPSS v. 26 and all analysis was conducted in R (R Core Team, 2020). Mean substitution was performed when less than 10% of items were missing in the LSAS-CA-SR, SCARED and SMFQ questionnaires. At variable level, missing data was

low, ranging from 0- 4.32% (CASCQ missing for 0 participants; LSAS-CA-SR was missing for n=8 participants, SCARED for n=29, and SMFQ for n=20). Pairwise deletion was used to manage missing data when examining validity for data missing at variable level.

The factor structure of the CASCQ was examined using a combination of Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) in the general adolescent sample. The sample was split in two randomly (.6/.4 ratio). EFA was conducted in the first half of the dataset and then this factor structure was confirmed in the second half using CFA.

The factor structure was examined separately for belief and frequency ratings. The frequency scale generates ordinal data, and so the Ordinary Least Squared method of extraction was used. For the belief scale, the Kolmogorov-Smirnov test showed that the data was normally distributed and so the maximum likelihood method of extraction was used. For both EFA an oblique rotation was used (Oblimin) because we expected the factors to be correlated with each other. To determine the appropriate number of factors to retain we used parallel analysis (for non-normal data in the case of frequency ratings, and normal data in the case of belief ratings) and we examined the scree plot and interpretability of the generated factors. In addition, we examined item loadings, and in line with Guadagnoli and Velicer (1988), considered factors on which four or more items had loadings of at least 0.6 as reliable. In terms of evaluating item loadings onto factors, we were guided by (Stevens, 2012), who suggested using a cut-off of 0.4. To test the goodness of fit of the models in the CFA, we examined the Standardized Root Mean Square Residual (SRMR), the Root Mean Square Error of Approximation (RMSEA), the Comparative Fit Index (CFI) and the Tucker Lewis Index (TLI). SRMR values below .08

and RMSEA values less than .06 indicate a good fit. CFI and TLI values greater than .90 suggest an acceptable fit.

The rest of the analysis was undertaken with the whole sample. First, mean scores were calculated for the total score and for the subscales derived from the indicated factor structure. Then, internal consistency of the total score and subscales was assessed with Cronbach's alpha, with alpha greater than .70 indicating acceptable consistency and above .80 good consistency (George & Mallery, 2016). To examine construct validity, correlations between the CASCQ totals and subtotals and the LSAS-CA-SR were examined, before carrying out partial correlations between the CASCQ totals and subtotals and the LSAS-CA-SR, controlling for GAD symptoms (from the SCARED) and then for depression symptoms (SMFQ). Finally, we examined age and gender differences in CASCQ-F and CASCQ-B total and subtotal mean scores.

6.3. Results

6.3.1. Exploratory Factor Analysis: Belief Ratings

The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO = 0.98) and Bartlett's test of sphericity ($\chi^2(378) = 17853.36$, $p < .001$) indicated that the data was suitable for factor analysis. Parallel analysis and examination of the scree plot (Figure 6.1.) suggested that two factors were appropriate for extraction.

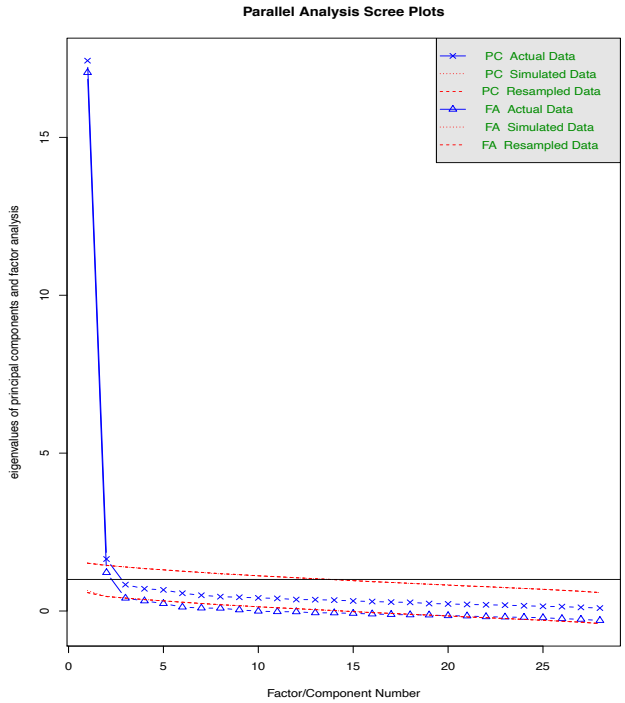


Figure 6.1. Scree plot of indicated factors to extract for CASCQ Belief data

The two-factor solution explained 65% of the variance, with the first factor explaining 39% and the second explaining 26%. Standardized factor loadings are shown in Table 6.1. Fifteen items loaded onto Factor 1, 14 of these had a loading of ≥ 0.60. Thirteen items loaded onto Factor 2. Seven of these had a loading of ≥ 0.60. The two factors were correlated (*r* = .76*),* which supports the idea that the two factors reflect related but not identical concepts. Factor 1 reflects 'negative self-concept' whilst Factor 2 represents 'anxious appearance'.

Table 6.1. Pattern matrix showing the CASCQ Belief item loadings with a two-factor solution

		Factor 1	Factor 2
1	I will be unable to speak	-0.03	**0.79**
2	I am unlikeable	**0.84**	0.01
3	I am going to tremble or shake uncontrollably	-0.04	**0.85**

4	People will stare at me	**0.51**	0.31
5	I am being an idiot	**0.75**	0.08
6	People won't want to be friends with me	**0.84**	0.04
7	I will be frozen with fear	-0.09	**0.93**
8	I will drop or spill things	0.17	**0.61**
9	I am going to be sick	0.07	**0.69**
10	I am not good enough	**0.92**	-0.08
11	I will babble or talk funny	0.31	**0.49**
12	I am not as good as others	**0.97**	-0.12
13	I will be unable to concentrate	0.32	**0.45**
14	I will be unable to write properly	0.07	**0.73**
15	People are not interested in me	**0.95**	-0.08
16	People won't like me	**0.96**	-0.06
17	People will make fun of me	**0.79**	0.1
18	I will sweat/perspire	-0.02	**0.74**
19	I am going red	0.10	**0.55**
20	I am weird/different	**0.72**	0.07
21	People will see I am nervous	0.21	**0.54**
22	People think I am boring	**0.63**	0.2
23	I will embarrass myself*	**0.75**	0.11
24	People will be angry with me*	**0.55**	0.3
25	I will get picked on and teased*	0.38	**0.44**
26	I will look stupid*	**0.76**	0.13
27	I will be forced to do things I don't want to do*	0.22	**0.58**
28	People will laugh at me*	**0.73**	0.12

NOTES: * Asterisked items are those items added to the original Social Cognitions Questionnaire when adapting the scale for children and adolescents.

6.3.2. Exploratory Factor Analysis: Frequency Ratings

The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO = 0.97) and Bartlett's test of sphericity ($\chi^2(378) = 13989.21$, $p < .001$) indicated that the data was suitable for factor analysis. Parallel analysis suggested that three factors were appropriate for extraction, examination of the scree plot (Figure 6.2.) indicated that between two and three factors were appropriate, and on examination of the factor loadings and interpretability, a two factor solution was decided upon.

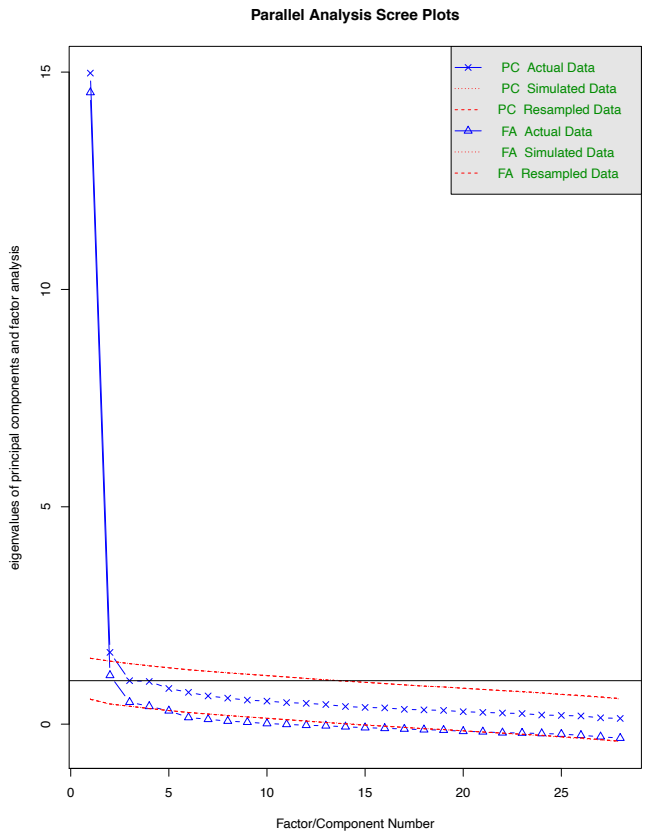


Figure 6.2. Scree plot of indicated factors to extract for CASCQ Frequency data

The two-factor solution explained 56% of the variance, with the first factor explaining 35% and the second explaining 21%. Standardized factor loadings are shown in Table 6.2. Sixteen items loaded onto Factor 1, twelve with a loading of ≥ 0.60. Twelve items loaded onto Factor 2. Six of these had a loading of ≥ 0.60. The two factors were correlated (*r* = .76*),* which supports the idea that the two factors reflect related but not identical concepts. Factor 1 reflects 'negative self-concept' whilst Factor 2 represents 'anxious appearance'.

Table 6.2. Pattern matrix showing the CASCQ Frequency item loadings with a two-factor solution

		Factor 1	Factor 2
1	I will be unable to speak	0.11	**0.56**
2	I am unlikeable	**0.92**	-0.09

3	I am going to tremble or shake uncontrollably	-0.08	**0.79**
4	People will stare at me	**0.44**	0.34
5	I am being an idiot	**0.73**	0.07
6	People won't want to be friends with me	**0.87**	-0.04
7	I will be frozen with fear	-0.01	**0.74**
8	I will drop or spill things	0.11	**0.51**
9	I am going to be sick	0.01	**0.63**
10	I am not good enough	**0.76**	0.08
11	I will babble or talk funny	0.26	**0.47**
12	I am not as good as others	**0.74**	0.08
13	I will be unable to concentrate	0.12	**0.55**
14	I will be unable to write properly	-0.06	**0.67**
15	People are not interested in me	**0.89**	-0.05
16	People won't like me	**0.99**	-0.16
17	People will make fun of me	**0.76**	0.1
18	I will sweat/perspire	0.04	**0.65**
19	I am going red	0.16	**0.46**
20	I am weird/different	**0.56**	0.22
21	People will see I am nervous	0.17	**0.62**
22	People think I am boring	**0.62**	0.13
23	I will embarrass myself	**0.62**	0.24
24	People will be angry with me	**0.47**	0.27
25	I will get picked on and teased	**0.53**	0.14
26	I will look stupid	**0.69**	0.14
27	I will be forced to do things I don't want to do	0.19	**0.55**
28	People will laugh at me	**0.65**	0.15

6.3.3. Confirmatory Factor Analysis

Based on the EFA, item 25 ('*I will get picked on and teased*') was dropped from the scale before the CFA, due to instability of loading. This is because the item loaded onto Factor 2 for Belief ratings (loading for Factor 1: 0.38; loading for Factor 2: 0.44), but onto Factor 1 for Frequency ratings (loading for Factor 1: 0.53; loading for Factor 2: 0.14). All other item loadings were stable. Loadings from the CFA are shown in Table 6.3.; loadings of all items for the Belief model and the Frequency model were 0.60 or above.

The fit of the model for Belief Ratings was found to be marginally acceptable. SRMR was acceptable (.047), but RMSEA was above the recommended threshold

(RMSEA = .092 (95% confidence interval [CI]: .086, .098)), and the CFI and TLI both fell just below the suggested threshold (CFI = .896 and TLI = .887). The fit of the model for the Frequency ratings was better, with all indices in the acceptable range. SRMR was .053 and RMSEA was .049 (95% CI: .042 - .057). CFI and TLI were both above .90 (CFI = .998 and TLI =.998).

Table 6.3. Item loadings from the CFA for CASCQ Belief and Frequency Ratings

	Belief	Frequency
Negative Self-Concept Factor		
I am unlikeable	0.86	0.89
People will stare at me	0.75	0.78
I am being an idiot	0.81	0.82
People won't want to be friends with me	0.87	0.86
I am not good enough	0.89	0.85
I am not as good as others	0.87	0.89
People are not interested in me	0.87	0.91
People won't like me	0.90	0.94
People will make fun of me	0.88	0.86
I am weird/different	0.73	0.77
People think I am boring	0.83	0.82
I will embarrass myself	0.88	0.86
People will be angry with me	0.79	0.78
I will look stupid	0.85	0.90
People will laugh at me	0.81	0.86
Anxious Appearance Factor		
I will be unable to speak	0.78	0.74
I am going to tremble or shake uncontrollably	0.75	0.75
I will be frozen with fear	0.79	0.74
I will drop or spill things	0.69	0.66
I am going to be sick	0.72	0.65
I will babble or talk funny	0.71	0.79
I will be unable to concentrate	0.72	0.77
I will be unable to write properly	0.71	0.71
I will sweat/perspire	0.77	0.71
I am going red	0.70	0.60
People will see I am nervous	0.81	0.82
I will be forced to do things I don't want to do	0.79	0.83

6.3.4. Internal Consistency

As can be seen in Table 6.4., internal consistency for the total scores and subscales was good for all frequency and belief scales, ranging from .90-.98.

6.3.5. Convergent Validity

Convergent validity of the CASCQ was inspected by examining the association between the total and subtotals (for both frequency and belief scales) with self-report measures of social anxiety (LSAS-CA-SR). As expected, and shown in Table 6.5., each subscale and the totals for both frequency and belief ratings were significantly and positively correlated with the LSAS total (*r*s > .5). To rule out the possibility that the association between the CASCQ and social anxiety symptoms is largely due to comorbid GAD or depression symptoms, the correlations between the CASCQ subtotals and totals and LSAS total were repeated first controlling for depression symptoms (Belief Total: *partial* r = .336, $p<.01$; Frequency Total: *partial* r = .580; $p<.01$), and second controlling for GAD symptoms (Belief Total: *partial* r = .300, $p<.01$; Frequency Total: *partial* r = .486; $p<.01$). Correlations with Belief and Frequency subscale scores also remained significant when simultaneously controlling for depression symptoms and for GAD symptoms ($p<.01$).

Table 6.4. Means and standard deviations and internal consistency of the CASCQ totals and subtotals.

	Female M (SD) (n = 357) ‡	Male M (SD) (n = 305) ‡	*t*-test (df)	Age 11-14y M (SD) (n = 482)	Age 16-18y M (SD) (n = 189)	*t*-test (df)	Total Sample (SD) (n =671)	Cronbach α (95% CI)
Belief								
Total	38.66	24.91	$t(660) = 6.65^{**}$	30.31	37.69	$t(669) = 3.16^{**}$	32.39	.98
	(26.66)	(26.35)		(27.10)	(27.40)		(27.37)	(.97, .98)
Negative self-concept	44.73	28.13	$t(660) = 7.14^{**}$	35.10	42.41	$t(669) = 2.77^{**}$	37.16	.97
	(31.66)	(29.09)		(30.81)	(30.57)		(30.90)	(.97, .98)
Anxious appearance	31.66	21.19	$t(660) = 5.34^{**}$	24.79	32.35	$t(669) = 3.41^{**}$	26.89	.94
	(24.91)	(25.46)		(25.37)	(25.85)		(25.71)	(.93, .94)
Frequency								
Total	2.51	1.84	$t(660) = 9.39^{**}$	2.10	2.47	$t(669) = 4.48^{**}$	2.21	.97
	(1.02)	(0.78)		(0.92)	(1.04)		(0.97)	(.96, .97)
Negative self-concept	2.80	2.01	$t(660) = 9.36^{**}$	2.33	2.70	$t(669) = 3.70^{**}$	2.44	.96
	(1.19)	(0.95)		(1.12)	(1.18)		(1.15)	(.96, .97)
Anxious appearance	2.19	1.66	$t(660) = 8.32^{**}$	1.84	2.21	$t(669) = 5.21^{**}$	1.94	.90
	(0.93)	(0.67)		(0.78)	(0.97)		(0.86)	(.89, .91)

NOTES: M = mean; SD = standard deviation; df = degrees of freedom; CI = Confidence Interval. ‡ n = 9 participants did not indicate their gender. * indicates $p < .01$; ** indicates $p < .001$

Table 6.5. Correlations between CASCQ totals and subtotals and social anxiety symptom measure.

	CASCQ-B	CASQ-B-N	CASQ-B-A	CASCQ-F	CASQ-F-N	CASQ-F-A
LSAS-CA-SR	**0.56****	**0.59****	**0.45****	**0.76****	**0.74****	**0.70****
CASCQ-B		0.97**	0.94**	0.71**	0.68**	0.66**
CASQ-B-N			0.83**	0.74**	0.76**	0.63**
CASQ-B-A				0.57**	0.50**	0.63**
CASCQ-F					0.97**	0.92**
CASQ-F-N						0.81**

NOTES: LSAS-CA-SR=Liebowitz Social Anxiety Scale for Children and Adolescents - Self-Report Version; CASCQ-B= Child and Adolescent Social Cognitions Questionnaire Total Belief; CASCQ-B-N=Child and Adolescent Social Cognitions Questionnaire Negative Self-Concept Belief; CASCQ-B-A=Child and Adolescent Social Cognitions Questionnaire Anxious Appearance Belief; CASCQ-F=Child and Adolescent Social Cognitions Questionnaire Total Frequency; CASCQ-F-N=Child and Adolescent Social Cognitions Questionnaire Negative Self-Concept Frequency; CASCQ-F-A=Child and Adolescent Social Cognitions Questionnaire Anxious Appearance Frequency.* indicates p <.01; ** indicates p<.001

6.3.6. Age and Gender Analysis

As can be seen in Table 6.4., in the general adolescent samples, girls scored more highly than boys and the older adolescents scored more highly than the younger adolescents on all totals and subtotals of the CASCQ. The same pattern of results is reflected in the LSAS-CA scores, with higher LSAS-CA scores in girls ($p<.01$) and older adolescents ($p<.01$).

6.4. Discussion

This study provides a preliminary psychometric analysis of the Social Cognitions Questionnaire (Clark, 2003), adapted for children and adolescents (CASCQ). Support for the reliability and validity of the scale in a general sample of UK adolescents was observed.

I was initially interested in examining the factor structure of the scale. I undertook EFA in a random half of the sample and identified a two-factor solution for both belief and frequency ratings. Item loadings were strong and broadly consistent across the two scoring forms. The factor structure was then supported in a CFA undertaken in the second half of the sample. The fit was acceptable for the frequency ratings. Whilst certain fit indices were only marginally acceptable for the belief ratings, all item loadings remained high. Inspecting the item loadings, one factor was interpreted as 'negative self-concept' and the other as 'anxious appearance'. Example items loading on the 'negative self-concept' factor include "*people will think I am boring*" and "*I am unlikeable*". Example items loading on the 'anxious appearance' factor include "*I will be unable to speak*" and "*I am going red*". The correlation between the two factors for the Belief rating was $r = .83$ and $r = .81$ for the Frequency rating. This suggests that the two factors show moderate overlap as one would expect, but they seem to measure slightly different aspects of social anxiety-related cognitions.

Although here two factors were identified compared to the three/four specified in the factor analysis undertaken by Clark (2005) in the adult SCQ, there is notable overlap in the apparent underlying constructs. For example, the first factor of the adult SCQ relates to negative self-concept, as we found here, and the second and third factors reflected anxious appearance, as our second factor did. The two factors are consistent with leading cognitive behavioural accounts of social anxiety (Hofmann, 2007; Rapee & Heimberg, 1997; Clark & Wells, 1995). These accounts align to suggest that unconditional negative beliefs about the self, such as "*I'm unlikeable*", lie at the heart of social anxiety, as do cognitions related to social performance deficits and observability of anxious feelings. The finding is important as it supports the suggestion that adult cognitive models of social anxiety, such as that of Clark and Wells (1995) are also relevant to youth (Leigh & Clark, 2018).

Typically measures of beliefs and cognitions in youth anxiety have assessed either the frequency or the strength of the belief. The CASCQ is unusual in measuring both frequency and belief ratings. Each shows substantial correlations with social anxiety. The correlation between frequency and belief (r = .71) suggests approximately 50% shared variance. Although the two are interrelated, it seems possible that they index slightly different features of cognition and it is therefore worth retaining both. In the present sample the correlation between social anxiety and frequency ratings is somewhat higher than between social anxiety and belief ratings. It would be interesting to examine whether this remains so in a clinical sample.

Encouragingly, the scale appears to be reliable, with excellent internal consistency for all the totals and subtotals. Examination of the patterns of association suggest that as expected, the CASCQ was positively and significantly correlated with a measure of social anxiety, but importantly the correlations with social anxiety symptoms persisted when controlling for depression symptoms and for generalised anxiety symptoms. This indicates

that the observed associations are not an artefact of the relationship between symptoms of either depression or generalised anxiety and negative social anxiety-related cognitions.

The finding that socially anxious cognitions were more frequent and strongly held amongst girls compared to boys in our general population sample was as expected given the consistent finding of higher levels of social anxiety in females (Westenberg et al., 2009). Similarly, the finding of an age effect was also expected, with higher levels of socially anxious cognitions in older, compared to younger, adolescents. Epidemiological studies consistently show increasing levels of social anxiety from early adolescence though to early adulthood (Westenberg et al., 2009).

6.4.1. Limitations

The study has a number of limitations. The CASCQ was designed for children and adolescents, but we only recruited adolescents. It will be important to see how the measure performs with pre-adolescents. The sample was recruited from schools. Future studies with clinic-recruited young people, including those with and without SAD, will be informative in terms of psychometric properties of the scale in a clinical population as well as its sensitivity and specificity. Participants completed the CASCQ at one time point only, and so the reliability of the measure over time is not yet known. Finally, the measures were exclusively self-report. This decision was made given the centrality of the internal veracity of these cognitions (rather than objective reality) to the persistence of social anxiety in cognitive behavioural accounts, but the inclusion of parent and/or teacher report symptom measures would be informative.

6.4.2. Conclusions

The present study describes the development of a measure of social anxiety-related cognitions for children and young people, the CASCQ and evaluation of its psychometric properties. With increasing interest in the adaptation of cognitive behavioural treatments for SAD, such as cognitive therapy for youth that have been proven to be highly effective for adult SAD (Mayo-Wilson et al., 2014), comes the need for questionnaires that measure key treatment targets. Here, I hope to have developed a tool that will be useful to both clinicians and researchers.

CHAPTER 7. A RANDOMISED CONTROLLED TRIAL OF ONLINE COGNITIVE THERAPY FOR ADOLESCENT SOCIAL ANXIETY DISORDER (OSCA).

The protocol for this randomised controlled trial was published in *Trials* (see Appendix): Leigh, E., Clark, D.M. (2019). Online Social anxiety Cognitive therapy for Adolescents (OSCA): protocol for a randomised controlled trial. *Trials, 20*(574). doi: 10.1186/s13063-019-3651-6

7.1. Introduction

As described in Chapter 1, there is a disparity between the number of child and adolescent therapists available in clinical services and the number of adolescents with SAD in need of treatment. It may be that delivering treatment for SAD via the internet offers part of the solution to this problem. One of the key benefits of online psychological interventions is their potential to be delivered in services where demand is high. There are other potential advantages. It may be more convenient because young people can use the treatment programme when it suits them. Travel time and costs for attending sessions are minimised. The disruption to schooling caused by therapy sessions, typically scheduled during working hours, is also almost eliminated. Young people interact with the online environment in all aspects of their lives (Lenhart, Purcell, Smith, & Zickuhr, 2010) and so receiving treatment this way may be especially appealing to this cohort. Accessing a treatment online may provide a greater sense of confidentiality and reduced embarrassment (Sweeney et al., 2019) which will be especially important for adolescents with social anxiety for whom feelings of shame and embarrassment are typical (Olfson et

al., 2000). However, as yet, there have been no studies examining the efficacy of internet-delivered cognitive therapy for SAD (CT-SAD) for adolescents. As outlined in Chapter 1, there is promising evidence for the use of face-to-face CT-SAD with adolescents (Leigh, Creswell, et al., 2021; Leigh & Clark, 2016; Ingul et al., 2014), for internet-delivered CT-SAD for adults (Clark et al., in preparation; Stott et al., 2013), and for internet-delivery of psychological therapies for adolescents (Vigerland et al., 2016; Cervin & Lundgren). The question arises as to whether internet CT-SAD is efficacious in adolescents. Related to this is the question of the level of adaptation required to the intervention when delivering for young people. One approach, adopted here, is to begin with minimal adaptations, made in collaboration with young patient and public involvement (PPI) representatives and to use this to guide decisions on whether, how much, and what type of further adaptations are needed.

The primary aim of the Online Social anxiety Cognitive therapy for Adolescents (OSCA) trial is to examine the effectiveness of a minimally adapted version of internet-delivered CT-SAD (OSCA) compared to waitlist for adolescent SAD. The main hypotheses are: (1) that treatment with OSCA will be superior to waitlist in reducing symptoms of social anxiety and that the proportion of adolescents meeting criteria for social anxiety disorder will be lower post-treatment compared to post-wait; (2) that gains will be maintained at follow-up; (3) OSCA will also be superior to waitlist in reducing symptoms of general anxiety and depression and parent-reported internalising symptoms and impairment; (4) social anxiety-related cognitions, safety behaviours and depression will mediate therapeutic improvement in exploratory analysis.

7.2. Methods

7.2.1. Design

The study followed a two-arm, parallel-group randomized controlled trial design. The experimental arm was Online Social anxiety Cognitive therapy for Adolescents (OSCA). The comparison arm was waitlist. There were three principal assessment time points: at baseline (pre-treatment/wait), mid-treatment/wait (week 8) and post-treatment/wait (week 15). Participants in the experimental arm were also assessed at 1-, 2-, 3- and 6-month follow-up. Post-wait, participants in the waitlist arm were offered OSCA. In addition to assessments with adolescents, assessments with parents were also undertaken where possible. The trial was prospectively registered (http://www.isrctn.com/ISRCTN15079139). Reporting of the RCT was in line with the CONSORT guidelines, and the CONSORT checklist is provided in the Appendix.

7.2.2. Sample size

Sample size was estimated from an RCT of adolescents with SAD comparing a version of face-to-face cognitive therapy with attention placebo (Ingul et al., 2014). The comparison effect size posttreatment was 1.26. A recent adult RCT by our group suggests outcomes for face-to-face and Internet-delivered cognitive therapy are similar (Clark et al., in preparation). Based on a conservative estimate of the effect of 1.00, we would need 17 per group for 80% power. The sample size was inflated to allow for drop out following randomisation (Smith et al., 2015), and so a total of 40 participants was sought.

7.2.3. Setting and Participants

The study was implemented in four non-selective state-sector secondary schools in the South East of England. Adolescents aged between 14 and 18 years (inclusive) at intake

with a diagnosis of SAD based on the Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-5) criteria were eligible for inclusion. Diagnosis was determined by the Anxiety Disorders Interview Schedule for children and parents Silverman and Albano (1996). Only adolescents for whom SAD was the primary problem were included. All participants had to be able to read and write in English due to the nature of the therapy and the need to complete self-report questionnaires. Young people who were currently receiving any other psychological intervention or who had previously received cognitive therapy or CBT for SAD were not invited to take part. Other exclusion criteria included: the presence of an autism spectrum disorder; learning disability; current alcohol or substance dependence; presence or suspected presence of psychosis; suicidal intent or recurrent self-harming behaviour; and young people identified by social services as currently 'at risk' due to child protection concerns.

7.2.4. Ethical Issues

The trial received approval from the University of Oxford Medical Sciences Division Research Board (reference number: R60464/RE001; see Appendix). The process of seeking informed consent differed for 14- to 15-year-olds and 16- to 18-year-olds. For 14- to 15-year-olds, parental consent and young person assent was sought. 16- to 18-year-olds were treated as 'competent youth' for the purposes of this study, and young person consent was sought. We sought agreement from all 16- to 18-year-olds to contact their parents.

7.2.5. Recruitment Procedure

Recruitment started in March 2019 and ended in December 2020. Participants were recruited via screening in secondary schools. For the school-led screening, young people aged 14-18 years were invited to complete the Mini-SPIN (Connor et al., 2000) and to

indicate whether or not they were interested in learning more about the study. The Mini-SPIN is a three-item questionnaire that is sensitive and specific to SAD in adults (Stein & Stein, 2008) and adolescents (Ranta, Kaltiala-Heino, Rantanen, & Marttunen, 2012). Screening was completed on paper forms or online, depending on school preference. Prior to initiating screening, participating schools sent information to parents and students informing them of the project and providing details of the screening. All young people who had indicated that they would like to learn more about the study were followed up by school staff to confirm potential eligibility.

7.2.6. Randomisation Procedure

Eligible participants were randomly allocated to OSCA or waitlist. Individual randomisation was conducted using an online minimisation algorithm (Sortition) generated by the trial statistician at the Nuffield Primary Care Clinical Trials Unit, University of Oxford. The ratio was 1:1. Minimisation ensured balance between trial arms for gender and school but retained a random element with stratification by social anxiety severity (using ADIS-CA clinical severity rating, in line with Masia Warner et al. (2016)). Randomisation occurred after consent was taken and baseline measures were completed. The trial team emailed details of the minimisation/stratification variables to the independent statistician who then randomised the participant. Following randomisation, participants were notified of their allocation.

7.2.7. Treatment

Online Social anxiety Cognitive therapy for Adolescents (OSCA) uses the same internet platform as the adult programme (iCT-SAD) with minor adaptations. With this study we were interested in examining the preliminary efficacy of a minimally adapted version of

iCT-SAD. To identify what initial adaptations would be needed for adolescents, five young PPI participants (aged 16-18y, A-level psychology students) worked through iCT-SAD and then provided their feedback and suggestions. They were prompted for suggestions in relation to case vignettes, illustrative video material, and language. They suggested that some video clips be re-filmed with young actors and that all case examples be made relevant to young people (e.g., describing adolescent-relevant situations, such as being at school and seeing friends, rather than being at work). These amendments were made and OSCA is the name we have given to the adapted version of iCT-SAD that was tested in the present study.

The OSCA program takes 14 weeks. All users receive a core set of eight modules (see Table 7.1.) to work through in the first two weeks of the programme. The programme is then individualised for each user. Up to 16 additional modules (see Table 7.1.) that focus on particular fears or problems can be released. The therapist releases modules that will be most helpful to that person, depending on their particular concerns. The programme includes a secure video conferencing facility with recording functionality to support conducting the self-focused attention and safety behaviour experiment and video feedback online, as well as practicing giving presentations to a virtual audience. Short video clips illustrate how to set up and conduct behavioural experiments.

Adolescents complete OSCA modules at home and they can logon as often as they like. During the 14 weeks of treatment, young people allocated to OSCA have weekly 20-minute phone conversation with their therapist, in line with procedures in the adult treatment trial (Clark et al., in preparation). The telephone call is to support and encourage young people and to ensure that they are given access to the modules that will be most

helpful to them. In addition, they receive regular encouragement and support via secure messaging within the online programme and SMS texts.

Decisions about the level of parental involvement were made on a case-by-case basis. This varied from no involvement (if participants aged 16-18 years declined parental involvement) to regular telephone calls and updates.

The only contact with participants in the waitlist arm during the wait period was at the mid-wait and end-wait time points, when they were asked to complete outcome measures. Participants in the waitlist arm were offered treatment with OSCA after the post-wait assessment.

Table 7.1. OSCA Modules

Core Modules (allocated to all users)
Introducing the treatment
Getting started
Feeling self-conscious
Safety behaviours
Attention & safety behaviours experiment
Watching your conversation videos
Getting out of your head and into the world
Behavioural experiments
Additional Modules (for particular concerns and problems)
Blushing
Shaking
Sweating
Having conversations
Feeling boring
Feeling stupid
Feeling responsible for others enjoyment
Decatastrophizing
Worrying in advance
Going over social situations after they've happened
Leaving the past behind
Managing my inner critic
Self-esteem
Managing my mood
Giving myself credit
My therapy blueprint
Modules for to help patients prepare for follow-up sessions
Preparing for first follow-up

Preparing for second follow-up
Preparing for third follow-up

7.2.8. Therapist and Supervision

Treatment was delivered by the author, a clinical psychologist with substantial prior experience of CT-SAD and who co-led its adaptation for adolescents. Regular supervision was provided by Professor David M Clark, developer of the adult treatment and underlying cognitive model.

7.2.9. Measures

The timing of administration of measures and interviews is provided in Table 7.2.

Table 7.2. Timing of questionnaires and interviews during the OSCA trial.

	STUDY PERIOD							
	Start treatment/ wait	Sessional Treatment only	Mid treatment/ wait	Sessional Treatment only	Post treatment/ wait	1- and 2-month follow-up Treatment only	3-month follow-up Treatment only	6-month follow up Treatment only
TIMEPOINT**	t_1	$t_2 - t_7$	t_8	$t_9 - t_{14}$	t_{15}	t_{16}	t_{17}	f_1
LSAS-CA-SR	X	X	X	X	X	X	X	X
ADIS-Child (& Parent) Report	X				X			X
RCADS-Child Report	X				X		X	X
SMFQ	X	X	X	X	X	X	X	X
SPWSS	X	X	X	X	X	X	X	X
Concentration	X		X		X		X	X
Social Satisfaction Scale	X		X		X		X	X
Social Participation Scale	X		X		X		X	X
Peer Victimisation Scale	X		X		X		X	X
CALIS – Child Report	X		X		X		X	X
CASCQ	X	X	X	X	X	X	X	X
CASAQ	X		X		X		X	X
CASBQ	X		X		X		X	X
WAI (Therapist & Self Report)	X[1]							
Credibility Scale	X[1]							
RCADS-Parent Report	X				X			
CALIS – Parent Report	X				X			

NOTES: X[1] = WAI and Credibility Scale are completed at session two of therapy. Abbreviations: LSAS-CA-SR= Liebowitz Social Anxiety Scale for Children and Adolescents, Self-Report Version; ADIS=Anxiety Disorders Interview Schedule; RCADS=Revised Child Anxiety and Depression Scale; SMFQ=Short Mood and Feelings Questionnaire; ASSWRS=Adolescent Social Summary Weekly Rating Scale; CASCQ=Child & Adolescent Social Cognitions Questionnaire; CASAQ=Child & Adolescent Social Attitudes Questionnaire; CASBQ=Child & Adolescent Social Behaviours Questionnaire; WAI=Working Alliance Inventory.

Primary outcome measures

The primary outcome of the trial was the self-report version of the Liebowitz Social Anxiety Scale for Children and Adolescents- Self-report Version (LSAS-CA-SR) (Masia-Warner et al., 1999), a measure of social anxiety symptoms. Respondents rate the anxiety (0-3) and avoidance (0-3) associated with 24 social and performance situations (total score ranges: 0-144). The scale and its psychometric properties are described in detail in Chapter 5 (Leigh & Clark, 2021a). In the present sample, the internal consistency of the scale was excellent at baseline (Cronbach's α = .94) and post-treatment/wait (Cronbach's α = .99).

Remission from diagnosis of SAD was also registered as a primary outcome. To assess remission, the proportion of adolescents who continue to meet DSM-5 diagnostic criteria for SAD at post-treatment/wait was examined. Diagnosis was made using The Anxiety Disorders Interview Schedule IV for Children and Parents (ADIS-C/P) (Silverman & Albano, 1996). All participants were interviewed with the child version and parents were interviewed where possible. Participants who withdraw from the study were also invited to complete the assessments. Assessments were completed face-to-face or via video link by trained assessors.

Secondary outcome measures

The Social Phobia Weekly Summary Scale (Clark, 2003) is a six-item scale measuring aspects of social anxiety including avoidance, self-focused attention, and rumination. Each item is rated from 0-8 with higher scores indicating greater severity. An average is calculated across the six items. Cronbach's alpha in the present sample was .78 at baseline and .89 post-treatment.

The Revised Child Anxiety & Depression Scale (RCADS; Chorpita et al. (2000)) is a 47-item self-and parent-reported measure of general anxiety and depression. Internal consistency in the present study was high for both the self-report version (Cronbach's α = .94 at baseline; Cronbach's α = .98 post-treatment) and the parent-report version (Cronbach's α = .92 at baseline; Cronbach's α = .96 at post-treatment).

Young people also completed the 13-item Short Mood and Feelings Questionnaire (SMFQ; (Angold et al., 1995)) as a measure of depression. Cronbach's alpha in the present sample was .91 at baseline and .94 post-treatment. Item 17 from the long MFQ was included as a screen for current suicidal ideation but the item score was not included in the SMFQ total score.

The Peer Victimisation Scale (Tillfors, Persson, Willén, & Burk, 2012) comprises three items regarding mocking, assault and social exclusion in the preceding week. Responses are rated on a scale of 1–4, generating a total score of 3–12. Cronbach's alpha in the present sample was .71 at baseline and .48 post-treatment. The relatively low internal consistency for the Peer Victimisation Measures is likely due to it being only a 3-item measure, with Cronbach's alpha particularly sensitive to the number of scale items (Field, 2009).

The Social Satisfaction Scale lists a range of typical social relationships and asks respondents to rate their satisfaction with them on a scale of 1–7, with higher scores indicating greater social satisfaction. The original Social Satisfaction Scale contains five items including one on romantic relationships, however given the age of the current sample this item was dropped, and a four-item version of the Social Satisfaction Scale was

used (total score range 4–28). Cronbach's alpha in the present sample was .62 at baseline and .81 post-treatment.

The Social Participation Scale lists 13 of typical social settings and asks respondents to rate how often they engage in them on a scale from 1-7, with higher scores indicating greater social participation (range 13-91). Cronbach's alpha in the present sample was .87 at baseline and .94 post-treatment.

Self-reported ability to concentrate in class over the preceding week was measured on a single item Likert scale from 0-8 with higher scores indicating better self-reported ability to concentrate (Leigh & Clark, 2016).

The child and parent version of the Child Anxiety Life Interference Scale was completed (CALIS; Lyneham et al. (2013)). The child version of the CALIS is comprised of nine items rated on a scale from 0-4, assessing the extent to which anxiety interferes with aspects of life, such as studying and socialising. The total range is 0-36 with higher scores indicating more anxiety-related impairment. Cronbach's alpha in the present sample was .85 at baseline and .92 post-treatment. The parent version is comprised of 16 items assessing the impact of the child's anxiety on the child's life and on their own life. Items are rated on a scale from 0-4 (total range: 0-72) with higher scores indicating greater interference. Internal consistency of the parent CALIS in the present sample was acceptable (α = .88 at baseline and α = .85 post-treatment).

Measures of possible mediators of therapeutic improvement

Negative social anxiety related thoughts: The Child & Adolescent Social Cognitions Questionnaire (CASCQ) is a self-report measure of social anxiety-related cognitions. Development and preliminary validation of the scale is described in Chapter 6 (Leigh & Clark, 2021b). Respondents are presented with 27 commonly occurring social anxiety related cognitions and asked to rate how frequently they experience the thought in social situations (1-5, never-always), and how much they believe the thought when it occurs (0-100, not at all-totally). An average frequency and belief rating is calculated across the 27 items. Cronbach's alpha of the frequency subscale was .91 at baseline and .98 at post-treatment, and of the belief subscale was .94 at baseline and .98 at post-treatment.

Safety behaviours: The Child & Adolescent Safety Behaviours Questionnaire (CASBQ) is a 33-item self-report measure of social anxiety related safety behaviours (Evans, Chiu, et al., 2021; Chiu et al., 2021a). Each item is rated from 0-3, and an average score calculated, with higher scores indicated greater use of safety behaviours.

Negative social anxiety related beliefs: The Child and Adolescent Social Attitudes Questionnaire (CASAQ; Leigh and Clark (2016)) is a 50-item measure of social-anxiety related beliefs. Each item is rated from 1 (totally disagree) to 7 (totally agree), and a mean score is obtained. Higher scores indicate more positive social attitudes. Internal consistency of the scale in the present sample was acceptable (α = .93 at baseline and α = .97 post-treatment).

Measure of therapeutic alliance and treatment credibility

Therapeutic alliance and treatment credibility were measured after two weeks of treatment, to examine their relationship with treatment outcome. The two-week timepoint was chosen

to ensure participants had received enough treatment to provide credibility and alliance ratings but not so much as for these to be affected by treatment outcome. In the OSCA arm, the quality of the therapeutic relationship, as perceived by both the therapist and the participants, was assessed with the 12-item shortened Working Alliance Inventory (Hatcher & Gillaspy, 2006). Items are rated on a 1-7 Likert scale (from 'Never' to 'Always'), and a total calculated (12-84) with higher scores indicating more positive perceived alliance. Internal consistency (Cronbach's alpha) was .82 for the young person version and .85 for the therapist version. In the OSCA arm, participants rated treatment credibility with the Credibility of Therapy Scale (Borkovec & Nau, 1972). This three-item scale asks participants to rate the extent to which the treatment is perceived as logical, the expectancy of a positive outcome, and confidence in recommending the treatment to a friend (each on a scale from 1-10). A mean score was calculated with higher scores indicating greater perceived treatment credibility. Cronbach's alpha was .83 in the present sample.

7.2.10. Analysis

Analyses were performed in R (R Core Team, 2020). All analyses were performed on the intention to treat sample unless specified. Statistical advice was provided by the Nuffield Primary Care Clinical Trials Unit, University of Oxford. Preliminary checks were performed to test whether the stratified randomisation was successful, examine the distribution of the data, and check for outliers. No transformations or exclusions were indicated. Descriptive statistics are reported for participant demographics.

Linear mixed effect models were used for the analysis of continuous variables over time, given their ability to include all available data from all randomised participants, and to account for the repeated-measures and multilevel nature of the data (timepoints nested

within participants), and to account for data missing at random. Time (mid-wait/mid-treatment, and post-wait/post-treatment), condition (OSCA, waitlist), and the time by condition interaction were specified as categorical fixed factors, with the stratification variables of baseline LSAS-CA-SR score and gender as fixed covariates and participant as a random effect to account for between-person variation. For the analysis of secondary outcome measures, the baseline score of the measure being analysed was also included as a fixed covariate, as well as baseline LSAS-CA-SR and gender. All models used restricted maximum likelihood estimation. The normality of residuals assumption was checked using Q-Q plots and met for all models.

Between-group effect sizes (Cohen's *d*) were calculated by dividing the adjusted group difference by the baseline standard deviation of the full study sample. 95% confidence intervals for Cohen's *d* were calculated by dividing the upper and lower limits of the adjusted group difference by the baseline standard deviation of the full study sample. Within-group effect sizes were calculated from linear mixed effects models that incorporated the baseline score as a timepoint rather than as a covariate, to obtain within-group adjusted means in relation to baseline. Following the rules of thumb outlined by Cohen (1988), effect sizes of 0.2, 0.5, and 0.8 indicated small, medium, and large effects, respectively.

For the analysis of maintenance of gains at 3- and 6-months follow-up, a series of linear mixed models were used with participants in the OSCA treatment arm. Time (baseline, post-treatment, 3-month, 6-month follow-up) was included as a categorical fixed effect and participant as a random effect to account for between-person variation. Gender was included as a fixed covariate. Where the effect of assessment time was significant, pairwise comparisons with a Bonferroni adjustment were used.

Diagnostic status was analysed using mixed effects logistic regression, with treatment condition as the independent variable and gender as a covariate. To assess whether participant-rated treatment credibility, participant-rated therapeutic alliance, and therapist-rated therapeutic alliance predicted clinical outcome, these three variables were entered into a linear regression to predict LSAS-CA-SR residualised gain scores. Baseline LSAS-CA-SR and gender were included as covariates.

Lastly, a series of exploratory analyses were performed to examine candidate mediators of the relationship between randomisation (treatment condition) and post-treatment LSAS-CA-SR scores. Candidate mediators were social anxiety related cognitions (CASCQ, frequency and belief ratings), social attitudes (CASAQ), safety behaviours (CASBQ), and low mood (SMFQ). Mid-wait/mid-treatment scores were used as the mediator, and post-treatment LSAS-CA-SR scores as the outcome. A model-based inference approach to causal mediation analysis was used (Imai, Keele, & Tingley, 2010). The average causal mediation effect (ACME), average direct effect, and the average total effect was estimated, and the percentage mediated was calculated. The ACME is the average intervention effect through the mediator; the average direct effect is the average intervention effect that works through all other mechanisms excluding the selected mediator; the average total effect is the average effect of the intervention on the outcome. The total effect is the sum of the ACME and the direct effect on the additive scale. The percentage mediated is the percentage of the average total effect that is accounted for by the average causal mediation effects relative. Mediation analysis used complete cases only. All models included baseline LSAS-CA-SR scores, gender, and baseline mediator scores as covariates. Models reversing the mediator and outcome variable but maintaining the temporal lag were also performed.

7.2.11. COVID-19 Disruption

In response to the COVID-19 pandemic, the Government of England took the decision to close all secondary schools from 20th March 2020 except to an exceptional minority of children. Schools reopened in a limited fashion in June 2020 and then fully in September 2020, with additional measures such as mask-wearing and year group 'bubbles' (in which social contact was limited to within year groups). Schools closed again in January 2021 and reopened in March 2021. As well as the restrictions placed on schools, the Government of England also imposed restrictions on travel, socialising, and attending hospitality, entertainment, and retail venues. Requirements to wear a face mask and maintain a social distance were also introduced. The pandemic-related restrictions and closures affected the trial in several ways. The trial was suspended from March 2020 – September 2020 during the first school closure. This meant that the wave of school screening that was due to commence in late March 2020 to recruit participants was cancelled. Despite the lockdowns, all trial participants received a full course of treatment. The two OSCA patients in active treatment when the first lockdown was imposed were at session 13 and session 14 of the programme and so they had completed all or almost all of therapy. For those on the waitlist (n=5) at that point, post-wait treatment was delayed until the trial recommenced. Pandemic related restrictions also led to all assessments moving online to video calls. For patients receiving treatment whilst COVID restrictions were in place, the therapist ensured that suggestions (e.g., for behavioural experiments) were always in line with current Government guidelines.

7.3. Results

7.3.1. Participant flow and demographics

Of the 57 potential participants who were assessed, 43 were eligible for the trial and gave informed consent (self/parent) and were therefore randomised. The final number recruited (N = 43) exceeded the target sample size (N = 40). This is because screening was completed in waves in schools and all young people who screened positive were invited to attend the eligibility assessment and invited to participate if they were eligible.

Demographic and clinical characteristics of the two groups are shown in Table 7.3. Ethnicity was categorised according to Government recommendations for England and Wales. 51.2% of the sample as a whole were White British (n=22), 25.6% were from Mixed or Multiple ethnic groups (n=11), 9.3% were Asian or Asian British (n=4), and 14% were Black, African, Caribbean or Black British (n=6). The total proportion of participants from minority ethnic backgrounds (48.8%) in the sample is greater than the average proportion of secondary school pupils of minority ethnic backgrounds in England (33.2% in 2019/2020). Fifty-six percent (n=24) of the total sample had a comorbid DSM-5 diagnosis at baseline. Thirteen had a diagnosis of generalised anxiety disorder (GAD), seven had a diagnosis of depression, three had a diagnosis of obsessive compulsive disorder (OCD), and one had a diagnosis of body dysmorphic disorder (BDD). Of these 24 participants, 11 had an additional DSM-5 diagnosis: four had a diagnosis of GAD, six had a diagnosis of depression, and one had a diagnosis of BDD. There were no significant differences between the groups in any of these characteristics. There were no significant differences between groups on the stratification variables of baseline ADIS-CA social anxiety clinical severity rating ($t(41)=1.13$, $p = .26$), sex (Fisher's Exact Test, $p = .96$), or school (Kruskal-Wallis H (3) = 0.32, $p = .96$), indicating randomisation was successful. Groups did not differ on any other clinical characteristics assessed (see Table 7.3.).

Two participants withdrew from the OSCA condition. One during the second week of treatment and the other during the fourth week of treatment. One completed the mid-treatment questionnaires, but neither were contactable at the post-treatment point. Questionnaire scores from the last week of treatment were used as the post-treatment scores for these two participants. Overall, complete data was provided by 20 (95.24%) participants in the waitlist condition at the mid-point and 21 (100%) in the waitlist condition at the post point, and by 20 (90.91%) of participants in the OSCA condition at both the mid-point and post point. The post-wait/post-assessment ADIS-CA interview was completed by 21 (100%) participants in the wait condition and 20 (90.91%) in the OSCA arm. The flow of participant recruitment and participation is shown in Figure 7.1.

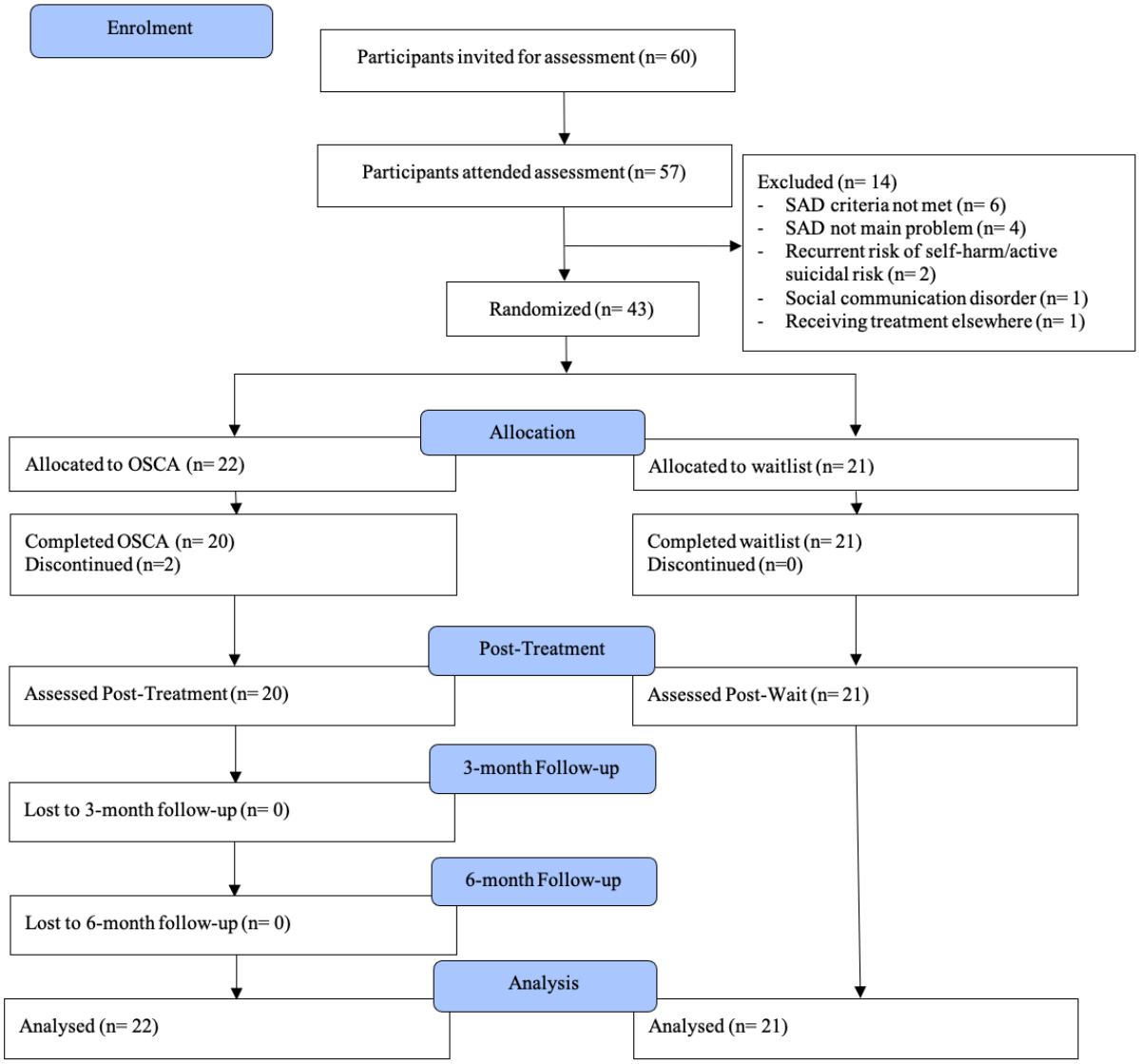


Figure 7.1. Participant flow through the trial.

Table 7.3. Demographic and clinical characteristics of the participants at baseline in the two conditions and the total sample.

	Waitlist (N=21)	OSCA (N=22)	Total (N=43)	Test statistic	*p* value
Age (years; M [SD])	16.42 (1.11)	16.04 (1.03)	16.22 (1.08)	$t(41)=1.17$	.25
Female (N [%])	19 (90%)	20 (91%)	39 (91%)	Fisher's Exact Test	.96
Historical peer victimisation (N [%])	6 (29%)	5 (23%)	11 (26%)	$\chi^2(1)=0.19$	.66

Ongoing peer victimisation (N [%])	6 (29%)	4 (18%)	10 (23%)	$\chi^2(1)=0.65$	.42
Previous psychological therapy (N [%])	9 (43%)	5 (23%)	14 (33%)	$\chi^2(1)=1.98$	.16
ADIS CSR for SAD diagnosis (0-8; M [SD])	5.62 (1.28)	5.23 (0.97)	5.42 (1.14)	$t(41)=1.13$	.26
Comorbidity (N [%])	13 (62%)	11 (50%)	24 (56%)	$\chi^2(1)=0.62$	.43
Current suicidal ideation (N [%])	5 (24%)	10 (46%)	15 (35%)	$\chi^2(1)=2.22$	.14
Deliberate self-harm (ever) (N [%])	4 (19%)	8 (36%)	12 (28%)	$\chi^2(1)=1.60$	.21

NOTES: M: mean; SD: standard deviation; ADIS CSR for SAD diagnosis: Anxiety Disorders Interview Schedule for Children and Adolescents Clinical Severity Rating for Social Anxiety Disorder diagnosis.

7.3.2. Therapist Activity

For the participants allocated to OSCA who completed treatment (n = 20), therapists made a mean of 14.11 (SD = 2.93) telephone calls over the course of the 14-week programme, lasting on average 24.02 minutes (SD = 4.23). They completed an average of 1.11 webchats (SD = 0.33) with an average duration of 62.44 minutes (SD = 11.40). Overall, the mean time spent in direct communication with participants was 398.67 minutes (6.65 hours) (SD = 59.38).

7.3.3. Patient Activity on OSCA

The core modules were released to all patients. On average 7.20 (range 5 to 11) additional modules were released. Patients logged onto the programme for a total of 26.14 hours (SD= 11.32) and recorded on average 25.00 (SD = 10.75) completed behavioural experiments.

7.3.4. Contact with Parents during OSCA

Three participants in the OSCA treatment group aged 16 or over declined to involve their parents in treatment at all. For the other 19 participants, decisions about contact with parents were made based on clinical assessment. For eight participants it was determined that contact with parents would be helpful. For two participants, both of whom had

comorbid depression, this was to provide support to carry out behavioural activation tasks as part of the 'Managing My Mood' module. For three participants, contact was indicated to support the young person in remembering therapy calls and completing homework tasks and modules. Parents of three participants asked for further information about the programme and so this was provided. For the remaining 11 participants, parents were contacted with requests to complete parent-rated questionnaires and attend assessment interviews only.

7.3.5. Clinical outcomes

Primary outcomes

Mean scores on the LSAS-CA-SR for each group at the key assessment points are shown in Figure 7.2. The linear mixed effect model indicated that the difference between groups was significant at the mid and post timepoints, with OSCA showing the superior effects. The between group effect size at post-treatment/wait was large, 2.31 (Cohen's *d*; 95% CI: 1.85; 2.76). Table 7.4. reports the unadjusted means and standard deviations, and Table 7.5. presents the adjusted group differences and effect sizes for all continuous outcomes.

Remission of SAD was also examined as a primary outcome using the ADIS-CA (Silverman & Albano, 1996). A clinical interview was conducted by an independent assessor blind to treatment condition, at the post-treatment/post-wait assessment point. Two participants from the OSCA group did not complete this interview, so change in diagnostic status could not be demonstrated. Of the 22 participants in the OSCA group, it could be demonstrated that 17 (77%) changed diagnostic status and no longer met DSM-5 diagnostic criteria for SAD at the end of treatment. Of the 21 waitlist participants, 3 (14%) no longer met DSM-5 criteria for SAD. A logistic regression to predict diagnostic status at post-treatment from treatment condition, with gender as a covariate, indicated that

treatment condition was a significant predictor, with the odds of no longer meeting diagnostic criteria over 20 times greater in the OSCA group (see Table 7.6.).

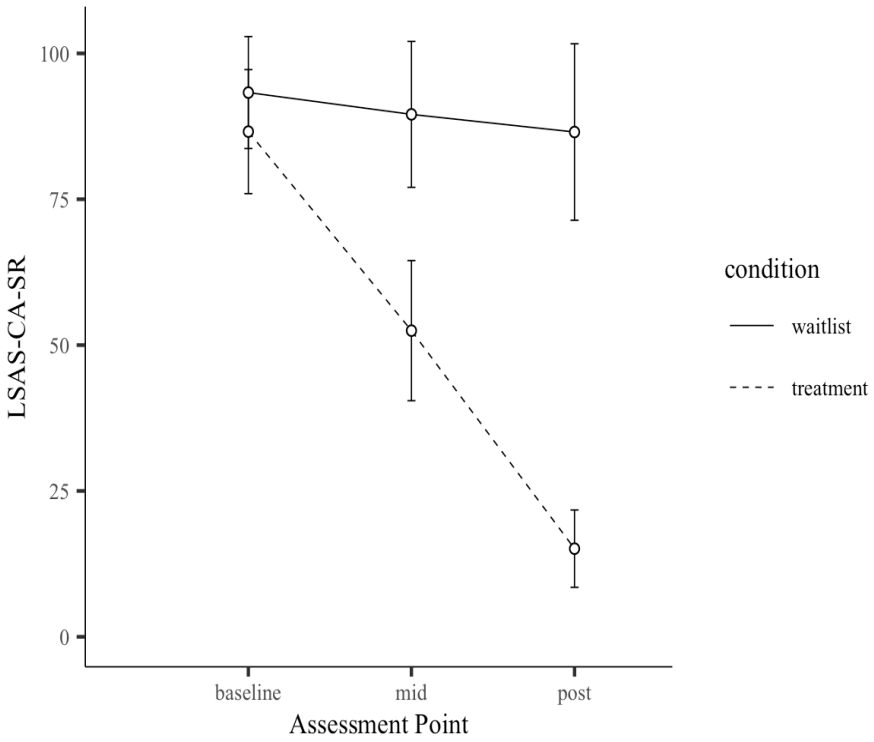


Figure 7.2. Mean scores on Liebowitz Social Anxiety Scale for Children and Adolescents – Self-Report version (LSAS-CA-SR) for the OSCA and Waitlist groups at the principal assessment points. Error bars represent 95% confidence intervals.

Table 7.4. Unadjusted means and standard deviations for the primary and secondary continuous outcome measures completers at each assessment

	Waitlist		OSCA	
Measure	M	SD	M	SD
LSAS-CA-SR				
Baseline	93.29	22.43	86.59	25.43
Mid	89.55	28.54	52.48	28.08
Post	86.52	35.37	15.11	15.15
3 months fu	-	-	11.75	10.57
6 months fu	-	-	16.45	13.64
SPWSS				
Baseline	37.22	7.66	31.61	8.27

Mid	28.17	10.00	21.44	8.04
Post	32.50	9.23	14.12	5.43
3 months fu	-	-	10.75	6.96
6 months fu	-	-	12.60	7.36
SCQ - frequency				
Baseline	3.40	0.60	3.02	0.74
Mid	3.09	1.01	1.87	0.59
Post	3.62	0.88	1.25	0.31
3 months fu	-	-	1.22	0.27
6 months fu	-	-	1.28	0.41
SCQ - belief				
Baseline	58.18	19.82	53.96	19.12
Mid	51.28	20.98	23.02	14.95
Post	53.86	23.80	7.43	7.77
3 months fu	-	-	6.38	6.56
6 months fu	-	-	7.64	9.88
SBQ				
Baseline	1.48	0.18	1.45	0.13
Mid	1.77	0.18	1.02	0.47
Post	1.45	0.15	0.40	0.24
3 months fu	-	-	0.48	0.34
6 months fu	-	-	0.45	0.23
SAQ				
Baseline	3.26	0.92	3.39	0.71
Mid	3.45	1.12	4.08	0.89
Post	3.45	0.93	5.23	0.69
3 months fu	-	-	5.32	0.80
6 months fu	-	-	5.25	0.74
Concentration				
Baseline	3.67	2.01	4.50	1.71
Mid	4.00	1.81	5.19	1.94
Post	3.71	1.76	6.25	1.29
3 months fu	-	-	6.05	1.43
6 months fu	-	-	5.50	2.01
Participation				
Baseline	50.32	15.06	48.20	13.98
Mid	48.10	12.78	55.30	8.57
Post	48.73	16.07	69.26	8.22
3 months fu	-	-	68.85	9.29
6 months fu	-	-	66.70	11.73
Satisfaction				
Baseline	15.81	4.85	15.98	3.61
Mid	16.90	4.70	20.55	3.36
Post	18.41	5.05	22.63	3.50
3 months fu	-	-	22.45	3.46
6 months fu	-	-	21.80	3.43
SMFQ				
Baseline	13.81	7.22	13.59	7.01
Mid	13.86	8.29	7.05	4.97
Post	13.10	7.37	4.05	3.72
3 months fu	-	-	4.00	3.48
6 months fu	-	-	4.85	4.84
RCADS				
Baseline	70.86	23.02	66.09	20.15
Mid	-	-	-	-
Post	63.62	25.56	21.52	16.57
3 months fu	-	-	-	-
6 months fu	-	-	23.58	14.72
CALIS				
Baseline	19.57	6.61	16.59	8.18

Mid	-	-	-	-
Post	17.81	6.90	7.16	5.25
3 months fu	-	-	7.70	4.74
6 months fu			6.80	5.86
RCADS - parent				
Baseline	42.53	16.25	41.50	16.95
Mid	-	-	-	-
Post	52.99	17.13	29.09	14.86
6 months fu	-	-	-	-
CALIS – parent				
Baseline	22.00	10.79	20.11	11.50
Mid	-	-	-	-
Post	26.69	9.93	12.53	11.32
6 months fu	-	-	-	-

NOTES: In the OSCA group, 22 participants provided complete data at baseline, 21 at mid-treatment, and 20 at posttreatment. In the wait group, 21 participants provided data at baseline, 20 at mid-treatment, and 21 at posttreatment. M = mean; SD = standard deviation; LSAS-CA-SR = Liebowitz Social Anxiety Scale for children and adolescents – self-report version; SPWSS = Social Phobia Weekly Summary Scale; SCQ = Social Cognitions Questionnaire (mean scores); SBQ = Social Behaviour Questionnaire; SAQ = Social Attitudes Questionnaire; SMFQ = Short Mood and Feelings Questionnaire; RCADS = Revised Child Anxiety and Depression Scale (total scores); CALIS = Child Anxiety Life Interference Scale.

Secondary outcomes

Significant group differences were found at post-wait/post-treatment in favour of OSCA on all secondary measures (see Tables 7.4. and 7.5.). Between group effect sizes ranged from 0.87 to 4.95. Findings suggest that compared to waitlist, OSCA was associated with significantly greater improvements in social anxiety related processes (safety behaviours, cognitions, and attitudes), depression, generalised anxiety, social functioning, concentration, and general functioning. Significant group differences were found at post-wait/post-treatment in favour of OSCA on parent-reported internalising symptoms (RCADS) and impairment (CALIS), with between group effect sizes of 1.37 and 2.07 respectively (see Tables 7.4. and 7.5.).

Follow-up

The OSCA group were followed up at 3- and 6-months post-treatment. All 20 participants who completed treatment and who attended post-assessments also completed the 3- and 6-month follow-up assessment. Figure 7.3. shows LSAS-CA-SR scores through treatment

and at 1-, 2-, 3-, and 6-month follow-up. As can be seen in Table 7.4., gains were maintained at follow-up point. Linear mixed models were undertaken with LSAS-CA-SR, SMFQ, RCADS, SPWSS, CASCQ (frequency and belief), CASBQ, CASAQ, concentration, and the CALIS as outcome measures. For all analyses, there was a significant effect of time ($p<.001$) and pairwise comparisons revealed significant differences between the baseline assessment and the post-treatment, 3-month, and 6-month follow-up assessments ($p<.001$ for all outcome measures) but no significant difference between post-treatment, 3-month and 6-month follow-up assessments ($p>.05$ for all outcome measures), suggesting that the substantial improvements on the outcome measures was maintained at each follow-up assessment point. For the RCADS, follow-up data was only available at the 6-month assessment point. A significant effect of time was found, with pairwise comparisons indicating a significant difference between baseline and post-treatment and baseline and 6-month follow-up assessment ($p < .001$), but no difference between post-treatment and 6-month follow-up assessment was observed ($p>.05$).

At the post-assessment, it could be demonstrated that 77% of the treatment group (17/22) no longer met criteria for DSM-5 diagnosis of SAD. At the second diagnostic assessment at 6-months post-assessment carried out by assessors blind to treatment allocation, this had increased to 91%.

Table 7.5. Adjusted differences, and effect sizes for the primary and secondary continuous outcome measures for the intention to treat sample

Measure	Adjusted difference (SE) [95% CI], *p* value		Effect size Cohen's *d* [95% CI]			
	Mid	Post	Between group at mid	Between group at post	Within group pre-post†	
					Treatment	Waitlist
LSAS-CA-SR	31.01 (6.29) [18.28, 43.74], $p < .001$	64.92 (6.29) [52.19, 77.65], $p < .001$	1.07 [0.63, 1.51]	2.31 [1.86, 2.76]	2.94 [2.39, 3.49]	0.22 [-0.05, 0.50]
SPWSS	6.07 (2.63) [0.80, 11.34], $p < .05$	64.92 (6.29) [52.19, 77.65], $p < .001$	0.64 [0.09, 1.22]	2.24 [1.57, 2.92]	1.75 [0.93, 2.57]	0.54 [-0.06, 1.03]
CASCQ - frequency	1.08 (0.21) [0.66, 1.53], $p < .001$	1.65 (0.22) [1.21, 2.09], $p < .001$	1.28 [0.78, 1.78]	2.41 [1.77, 3.05]	2.42 [1.66, 3.16]	0.43 [-0.03, 0.83]
CASCQ- belief	25.29 (4.62) [16.04, 34.54], $p < .001$	42.98 (4.62) [33.73, 52.23], $p < .001$	1.36 [0.86, 1.86]	2.34 [1.84, 2.85]	2.75 [2.09, 3.40]	0.19 [-0.12, 0.51]
CASAQ	-0.51 (0.21) [-0.93, -0.09], $p < .05$	-1.52 (0.21) [-1.94, -1.10], $p < .001$	0.53 [0.09, 0.97]	1.99 [1.44, 2.55]	2.29 [1.70, 2.90]	0.20 [-0.11, 0.52]
CASBQ	0.71 (0.09) [0.53, 0.89], $p < .001$	1.01 (0.09) [0.83, 1.19], $p < .001$	1.93 [1.44, 2.42]	4.95 [4.07, 5.83]	5.22 [4.25, 6.20]	0.18 [-0.94, 0.59]
Concentration	-0.89 (0.51) [-1.91, 0.13], $p = .09$	-2.22 (0.51) [-3.24, -1.20], $p < .001$	0.46 [0.07, 0.99]	1.40 [0.76, 2.04]	1.08 [0.27, 1.89]	0.03 [-0.43, 0.49]
Participation	-6.65 (3.24) [-0.16, -13.14], $p < .05$	-21.67 (3.20) [-15.26, -28.08], $p < .001$	0.60 [0.01, 1.18]	1.64 [1.16, 2.13]	1.92 [1.33, 2.51]	0.10 [-0.40, 0.21]
Satisfaction	-3.08 (1.14) [-0.79, -5.37], $p < .01$	-3.91 (1.14) [-1.62, -6.20], $p < .01$	0.74 [0.19, 0.29]	0.87 [0.36, 1.39]	1.09 [0.42, 1.75]	0.51 [0.18, 0.85]
SMFQ	6.66 (1.29) [4.07, 9.25], $p < .001$	9.00 (1.29) [6.41, 11.59], $p < .001$	0.96 [0.58, 1.33]	1.49 [1.06, 1.92]	1.55 [1.09, 2.01]	0.10 [-0.35, 0.16]

RCADS	-	35.44 (4.83) [25.66, 45.22], $p < .001$	-	1.60 [1.16, 2.04]	1.87 [1.35, 2.38]	0.29 [0.02, 0.56]
CALIS	-	7.41 (2.02) [3.32, 11.50], $p < .001$	-	1.18 [0.53, 1.82]	1.04 [0.45, 1.62]	0.25 [-0.16, 0.66]
Parent RCADS	-	22.56 (6.32) [9.87, 35.25, $p<.001$]	-	1.37 [0.60, 2.14]	1.32 [0.64, 2.00]	0.39 [-0.08, 0.87]
Parent CALIS	-	12.21 (4.12) [3.92, 20.50, $p<.01$]	-	2.07 [0.91, 3.23]	0.88 [0.37, 1.40]	0.09 [-0.33, 0.51]

NOTES: In the OSCA group, 22 participants provided complete data at baseline, 21 at mid-treatment, and 20 at post-treatment. In the wait group, 21 participants provided data at baseline, 20 at mid-treatment, and 21 at post-treatment. All linear mixed effects models included baseline LSAS and gender as covariates, and a random effect of participant. SE = standard error; CI = confidence interval; LSAS-CA-SR = Liebowitz Social Anxiety Scale for Children and Adolescents – Self-Report version; SPWSS = Social Phobia Weekly Summary Scale; CASCQ = Child & Adolescent Social Cognitions Questionnaire (mean scores); CASBQ = Child & Adolescent Social Behaviour Questionnaire; CASAQ = Child & Adolescent Social Attitudes Questionnaire; SMFQ = Short Mood and Feelings Questionnaire; RCADS = Revised Child Anxiety and Depression Scale (total scores); CALIS = Child Anxiety Life Interference Scale. The RCADS and CALIS were completed at baseline and post-treatment/wait, not at mid-treatment/wait. [†]Within-group effect sizes obtained from separate linear mixed effects models including baseline score as a timepoint (see method).

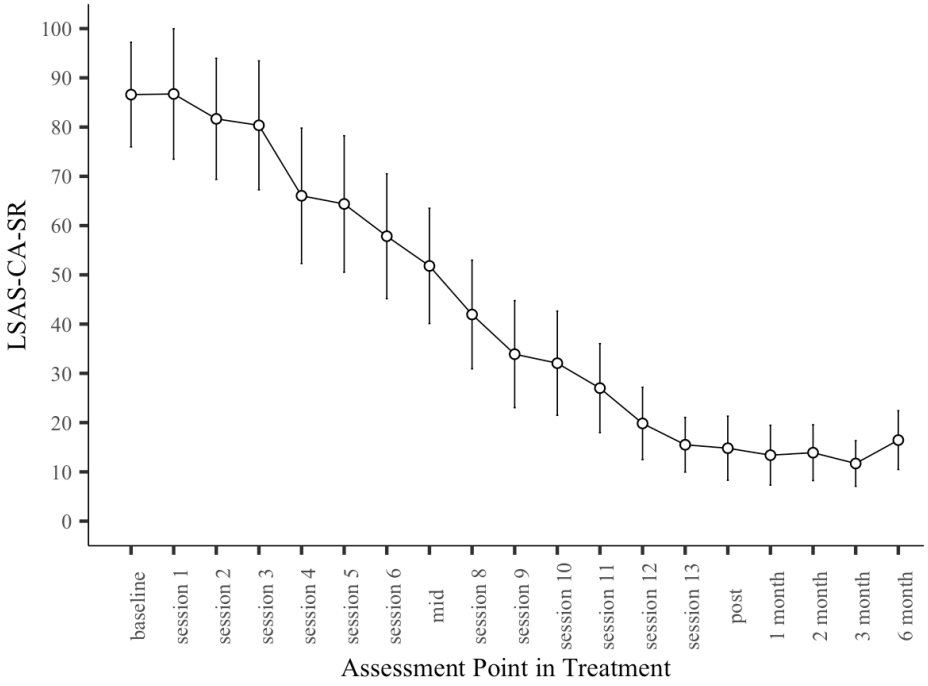


Figure 7.3. Mean scores on the Liebowitz Social Anxiety Scale for Children and Adolescents - Self-Report Version (LSAS-CA-SR) weekly during treatment and at follow-up assessment points for the OSCA treatment group. Error bars represent 95% confidence intervals.

Table 7.6. Logistic regression to predict social anxiety disorder diagnostic status at post-wait/post-treatment

	Estimate (*SE*)	*Z*	*p*	Odds ratio [95%CI]
Intercept	-1.51 (1.36)	1.23	.267	0.22
Gender	0.31 (1.37)	0.23	.818	1.37 [0.09, 19.93]
Condition	3.02 (0.81)	3.75	<.001	20.54 [4.22, 99.88]

NOTES: SE = standard error; CI = confidence interval; Overall model: χ^2 (2) = 40.75, p<.001, R^2 = .352 (Cox & Snell), .470 (Nagelkerke).

Therapeutic Alliance and Treatment Credibility

In the OSCA arm, ratings of therapeutic alliance (by participant and therapist), and treatment credibility (by participant) were made following two weeks of treatment. Excluding the two OSCA participants who had withdrawn from treatment at this point and the one participant who failed to complete their alliance and credibility measures (remaining n = 19), the mean participant rated alliance score was 75.00 (SD = 4.97) and the mean therapist rated alliance score was 69.25 (SD = 5.39). The participant rated credibility score was also high, with a mean rating of 8.70 (SD = 0.91).

A linear regression to predict LSAS-CA-SR residualised change scores (at post-treatment) from participant-rated treatment credibility, participant-rated therapeutic alliance, and therapist-rated therapeutic alliance, including baseline LSAS-CA-SR score and gender as covariates was not significant ($F(5, 17) = 1.27$, $p = .340$, adjusted $R^2 = 0.07$). Participant-rated treatment credibility ($b = -0.170$, $p = .662$), participant-rated therapeutic alliance ($b = -0.103$, $p = .919$), and therapist-rated therapeutic alliance ($b = 1.304$, $p = .205$) did not significantly predict clinical improvement as measured by the LSAS-CA-SR.

Table 7.7. Mediation of post-wait/post-treatment scores

Models: Mediator = LSAS-CA-SR at post							
Mediator (at mid)	Total Effect		Direct Effect		Indirect Effect		% Mediated
	Adjusted Difference [95% CI]	*p*	Adjusted Difference [95% CI]	*p*	Adjusted Difference [95% CI]	*p*	
CASCQ-f	-49.33 [-60.14, -39.02]	<.001	-36.02 [-49.58, -22.84]	<.001	-13.31 [-22.99, -4.62]	<.01	27
CASCQ-b	-47.98 [-58.38, -37.23]	<.001	-28.46 [-42.26, -14.37]	<.01	-19.52 [-31.43, -9.27]	<.001	41
CASBQ	-47.77 [-58.92, -35.32]	<.001	-30.66 [-48.34, -12.49]	<.01	-17.11 [-29.69, -3.78]	<.01	36
SMFQ	-48.25 [-59.40, -37.22]	<.001	-39.05 [-51.81, -25.89]	<.001	-9.20 [-18.16, -0.23]	<.05	18
CASAQ	-48.38 [59.07, -37.19]	<.001	-40.54 [-52.87, -28.33]	<.001	-7.83 [-16.37, -0.40]	<.05	15
'Reversed' models: Mediator = LSAS-CA-SR at mid							
Outcome (at post)	Total Effect		Direct Effect		Indirect Effect		
	Adjusted Difference [95% CI]	*p*	Adjusted Difference [95% CI]	*p*	Adjusted Difference [95% CI]	*p*	
CASCQ-f	-1.36 [-1.71, -0.99]	<.001	-0.81 [-1.31, -0.32]	<.001	-0.55 [-0.98, -0.20]	<.01	42
CASCQ-b	-34.24 [-41.39, -27.06]	<.001	-18.34 [-27.55, -8.94]	<.001	-15.83 [-24.45, -8.32]	<.001	46
CASBQ	-0.85 [-1.01, -0.69]	<.001	-0.67 [-0.88, -0.45]	<.001	-0.18 [-0.35, -0.03]	<.05	21
SMFQ	-7.72 [-10.01, -5.31]	<.001	-5.37 [-8.43, -2.49]	<.01	-2.34 [-4.70, -0.24]	<.05	31
CASAQ	1.13 [0.73, 1.53]	<.001	0.78 [0.29, 1.31]	<.01	0.35 [-0.03, 0.72]	.074	30

NOTES: Coefficients estimated using linear mixed effects models, with total, direct, and indirect effects calculated following Baron and Kenny (1986). All models included baseline scores on the mediator and outcome variables as fixed covariates, and a random effect of participant. SE = standard error; CI = confidence interval; LSAS-CA-SR = Liebowitz Social Anxiety Scale – Child & Adolescent Version (Self-Report); CASCQ-f = Child & Adolescent Social Cognitions Questionnaire (frequency subscale); CASCQ-b = Child & Adolescent Social Cognitions Questionnaire (belief subscale); CASBQ = Child & Adolescent Social Behaviour Questionnaire; SMFQ = Short Mood and Feelings Questionnaire; CASAQ = Child & Adolescent Social Attitudes Questionnaire.

Mediation of Clinical Improvement

Exploratory analysis of candidate mediators of clinical improvement was undertaken using linear mixed models. Results are presented in Table 7.7. The relationship between randomisation (treatment condition) and post-wait/post-treatment scores on the LSAS-CA-SR was mediated by mid-wait/mid-treatment social anxiety-related cognitions, attitudes, safety behaviours, and depression. Social anxiety related cognitions (belief) and safety behaviours showed the strongest mediation effect. Models in which the mediator and outcome variables were reversed also showed significant mediation for all candidate mediators, except for social attitudes.

7.4. Discussion

The overall aim of this study was to examine whether a version of iCT-SAD with minimal adaptations for adolescents (OSCA) is superior to waitlist.

Consistent with the first hypothesis, the OSCA treatment group made significantly greater improvements in social anxiety symptoms compared to waitlist, with a between-group effect size of 2.31 (Cohen's *d*). On average, the OSCA group demonstrated a 66-point decrease on the LSAS-CA-SR (range: 0-144) relative to the waitlist group. Also in line with the first hypothesis, a greater proportion of adolescents in the OSCA arm no longer met criteria for a DSM-5 diagnosis of SAD post-treatment compared to those in the waitlist arm, 77% vs. 14% respectively. The findings of the present study are consistent with those of Ingul and colleagues who undertook a RCT comparing a version of CT-SAD delivered face-to-face to adolescents, with group exposure-based CBT, and attention placebo (Ingul et al., 2014), and reported a large between groups effect size (CT-SAD vs. attention-placebo) post-treatment (1.26 [95% CI: 0.55, 1.97]). Similarly large pre-post effects were reported in two case series I undertook with colleagues of face-to-face CT-

SAD for adolescents (Leigh, Creswell, et al., 2021; Leigh & Clark, 2016), with pre- to post-treatment drops of 82 (when treatment was delivered by the author) and 56 points (when treatment was delivered by CAMHS clinicians undergoing training in CT-SAD) on the LSAS-CA-SR, compared to a 72 point drop in the current study. Whilst comparisons between studies with different samples and designs is difficult, these findings do suggest that outcomes from internet-delivered CT-SAD are broadly comparable to those associated with face-to-face treatment.

Findings from the present study and the studies discussed above suggest that treatment approaches for adolescents based on the Clark and Wells' cognitive model (Clark & Wells, 1995) are associated with large, clinically meaningful improvements. This is important because the standard exposure-based CBT used to treat adolescents with SAD (and other common anxiety disorders) in routine services is associated with far more modest outcomes. For example, in a recent meta-analysis, we found that the recovery rate for children and young people with SAD from exposure-based CBT was 34% (Evans, Clark, et al., 2021), much lower than the 77% reported here.

As well as reductions in social anxiety symptoms, improvement was seen on all secondary outcome measures, in line with hypotheses. Large improvements in self-reported depression and general internalising symptoms were observed (between group effect sizes on the SMFQ and RCADS of 1.49 and 1.60 respectively). The finding that an intervention that is fairly tightly focused on social anxiety can lead to more general improvements in mood and internalising symptoms is consistent with previous studies in adults (Cuijpers, Cristea, Weitz, Gentili, & Berking, 2016). The majority of adolescents presenting with SAD will have these associated difficulties (Garcia-Lopez, Bonilla, & Muela-Martinez, 2016), and so if replicated this finding has valuable clinical implications because it suggests that an additional separate depression intervention may not be needed.

It would be interesting to examine this further, by for example, focusing on samples with comorbid SAD and depressive disorders to establish whether we see the same magnitude of effects or whether additional depression treatment is needed (e.g., Chorpita and Weisz (2009)). One would expect that where depression is secondary to SAD, OSCA should be effective in reducing depression, whilst in cases where SAD and depression are genuinely comorbid, an additional depression-targeted intervention may be indicated. Large improvements were also found on social participation, social satisfaction, and anxiety-related impairment indicating that OSCA is also associated with self-reported functional improvement. In addition, reported ability to concentrate in class showed substantial improvements, suggesting that the treatment could potentially improve academic as well as health-related outcomes (Leigh, Chiu, & Clark, 2021). Compared to waitlist, large effects of treatment on internalising symptoms and impairment were also reported by parent/carers.

Across all symptom measures, it was found that participants continued to show substantial improvements compared to baseline at each follow-up point and post-treatment gains were maintained up to six months follow-up. Whilst improvements on continuous measures of symptoms and functioning were stable from post-treatment to the 6-month follow-up assessment point, a further three participants who had met criteria for SAD at post-treatment went on to recover by the 6-month assessment point, increasing the overall recovery rate to 90%.

With 20 of the 22 participants allocated to the OSCA group completing treatment, it appears that with fairly minimal adaptations, an internet-delivered version of CT-SAD can be delivered successfully to young people. A qualitative study that has been undertaken with participants post-OSCA also indicates a high degree of acceptability of the treatment (Leigh, Travlou, & Clark, in preparation). Consistent with this, ratings of

treatment credibility in the present study were high. In addition, despite the relatively brief remote therapist input, therapeutic alliance ratings by both therapist and participant were high, as has been found in adult studies of iCT-SAD (Clark et al., in preparation). Young person alliance ratings were in line with those reported in other studies of internet-delivered psychological therapy for adolescent anxiety disorders (Stjerneklar, Hougaard, & Thastum, 2019; Anderson et al., 2012). However, neither credibility nor alliance ratings were predictive of clinical outcome. One possibility is that this non-significant finding is a result of the restricted range on the credibility and the alliance scores, because all participants scored both measures highly (Bland & Altman, 2011). An alternative explanation is that these aspects of therapy are not responsible for treatment gains. This suggestion is in keeping with other studies of internet-delivered cognitive behavioural therapy for adolescent anxiety disorders (Stjerneklar et al., 2019) and findings from a meta-analysis showing that alliance ratings collected early in the course of therapy are not associated with outcome (McLeod, 2011).

The hypothesized treatment targets – social anxiety related cognitions, safety behaviours, and social attitudes – all showed large improvements with OSCA compared to waitlist (between groups effect sizes of 1.99-4.95). In exploratory mediation analysis, mid-treatment scores on these process variables were found to mediate the observed effect of treatment on the LSAS-CA-SR. This provides support for the hypothesis that OSCA works by changing key maintenance processes in the Clark & Wells (1995) cognitive model. Significant reverse mediation was also shown for social cognitions and safety behaviours also (but not social attitudes). This points to the possible presence of a cyclical relationship between symptoms and process variables. For example, it may be that the strength of an adolescent's social anxiety related cognitions reduces with treatment leading to lower levels of social anxiety and in turn, as the adolescent feels less socially anxious and avoids

less, they come to believe their negative social thoughts less. However, it will be important to examine the temporal association between process variables and symptom measures on a weekly basis in future to disentangle the pattern of change. Depressive symptoms were also found to be a mediator of therapeutic improvement and reverse mediation was also observed. This suggests that there may be a virtuous cycle of improvement in social anxiety symptoms and depressive symptoms during treatment.

7.4.1. Limitations

Participants for the present study were actively recruited via schools rather than via routine referrals to services. It is therefore possible that the sample are not representative of the adolescents usually seen in routine services. However, at the start of treatment, participants showed levels of social anxiety (mean LSAS-CA-SR score of 89.86 (SD = 23.97)) similar to those reported in a study of adolescents recruited via CAMHS services (mean LSAS-CA-SR of 97.41 (SD = 26.02); Leigh, Creswell, et al. (2021)). Furthermore, at baseline, participants endorsed scores on the RCADS (the measure of internalising symptoms) that were in line with baseline assessment scores reported in an audit of CAMHS service in the UK (Gibbons, Harrison, & Stallard, 2021). Over half of the sample had a comorbid diagnosis, a third were currently experiencing suicidal ideation, and just under a third had engaged in deliberate self-harm at some point in their lives. These clinical characteristics suggest that the findings are relevant for young people referred to clinical services. Furthermore, there is a global effort to increase provision of mental health interventions in schools (Patalay et al., 2016) and the findings from this study suggest OSCA could be delivered successfully in these types of services. For example, in England in 2017, the Department of Health and Department of Education launched Mental Health Support

Teams to deliver psychological interventions for common mental health problems such as SAD in school settings.

The sample was overwhelmingly female, despite recruiting from non-selective mixed secondary schools. This limits the conclusions we can draw about the effectiveness of the programme with males. Although SAD is more prevalent in females compared to males (Asher, Asnaani, & Aderka, 2017), the discrepancy observed in the present sample is far greater than one would expect. Future studies that include more males will be important to examine the efficacy of the programme amongst males. In addition, we need to understand potential recruitment barriers for males to ensure clinical services that may use screening procedures such as the one used in this study are not reducing the number of adolescent males accessing help.

In future studies, inclusion of health economic measures will allow a closer examination of the possible economic benefits of internet delivery of therapy for adolescents with SAD. Furthermore, the lack of a reliable, multi-item measure of self-focused attention in the trial meant that it was not possible to examine the effect of OSCA on this key treatment target, or to examine the hypothesis that it is a therapeutic mechanism. Two items of the SPWSS, completed weekly throughout treatment and at follow-up, assess self-focused attention (in social situations that the individual finds difficult and in social situations in general). However, these items were not analysed as outcomes or in the exploratory mediation analysis. This is because there is a lack of information about their validity and reliability and scales with few items are inherently likely to be less reliable. As a result, it is difficult to interpret findings in a meaningful way. It will be of great value to develop an appropriate measure of self-focused attention for adolescents with sound psychometric properties to be included in future studies. Alternatively, it may be useful to adapt an existing validated measure such as the 10-item

Focus of Attention Questionnaire (Woody, 1996) for adolescents and establish its reliability and validity.

A further limitation is the use of a waitlist control condition, which means examination of the relative contribution of specific and non-specific treatment effects was not possible. The waitlist condition was deemed appropriate given this was the first trial of this intervention in adolescents, but a further trial with an active comparator will be important. The generalisability of the findings is also limited because the therapist assisting OSCA was the author, a highly specialist clinical psychologist who has led the adaptation of treatment for young people. The question of whether similar outcomes can be achieved by clinicians working in routine settings therefore needs to be addressed.

7.4.2. Conclusions

Findings from this preliminary study suggest that a therapist-assisted internet-delivered version of CT-SAD can be delivered to adolescents with high efficacy. If replicated, this could meaningfully improve outcomes for young people with SAD, for whom outcomes with the current standard treatment are disappointing. OSCA offers the potential of an accessible, effective intervention for this population.

CHAPTER 8. GENERAL DISCUSSION

When we look back to our teenage years, most of us will remember it as a time when we were preoccupied by our friendships, and we will recall feelings of self-consciousness and a certain amount of angst about how we came across to other people. For the majority, these concerns did not dominate or get in the way and they receded with the transition to adulthood (Weems & Costa, 2005). But for some young people the worries are more severe and unrelenting and lead to avoidance and interference in day-to-day life. It is perhaps unsurprising then that adolescence typically marks the onset of social anxiety disorder (SAD).

Intervening early has the potential to offset the long-term individual, familial, and societal burden associated with the disorder. Great strides have been made in the understanding and treatment of *adult* social anxiety. During the last few decades it is probably fair to say that this is in part because anxiety researchers have developed detailed disorder specific models that identify key cognitive and behavioural abnormalities that can be targeted in therapy (e.g., Heimberg et al. (2010); Clark (2004); Rapee and Heimberg (1997); Clark and Wells (1995)). Historically, the approach to anxiety disorders including SAD in youth has been to develop general therapy procedures based on broad theory rather than to understand the phenomenology and specific therapy targets (Creswell et al., 2014). Arguably this has constrained the development of effective treatments for this population (Evans, Clark, et al., 2021). The aim of this thesis was to learn lessons from the advances in adult SAD to improve our understanding of the psychological mechanisms implicated in the maintenance of adolescent SAD and to improve treatment outcomes in this way.

The thesis addressed the following three research questions:

Research Question 1. Are the psychological processes specified in the cognitive model of Clark & Wells (1995) applicable and causally related to adolescent social anxiety?

Research Question 2. Can self-report measures reliably and validly measure social anxiety symptoms and social anxiety-related cognitions in adolescents?

Research Question 3. Is treatment based on the Clark & Wells model that is delivered to adolescents via the internet superior to a waitlist?

8.1. Overview of Results

Chapters 2, 3 and 4 (Studies 1, 2, and 3) were concerned with answering Research Question 1. Chapter 2 comprised a systematic review of published empirical studies that have examined the association of the key processes invoked in the Clark & Wells' cognitive model (Clark & Wells, 1995) with social anxiety in adolescents. Promising evidence for each of the processes: negative social cognitions, negative self-imagery, self-focused attention and safety behaviours, and their association with adolescent social anxiety symptoms was found. However, almost all studies used a correlational design and as a result it is not possible to tease apart whether the processes of interest are causes, consequences or correlates of adolescent social anxiety. Cognitive behavioural accounts rest on the assumption that these processes are driving social anxiety and as such should be the targets of intervention. Determining the causal status of these processes in adolescent social anxiety is therefore important. Chapters 3 and 4 (Studies 2 and 3) set out to do this. The Chapters described a pair of experimental studies in which key processes (negative

self-imagery in Chapter 3 and self-focused attention and safety behaviours in Chapter 4) were manipulated during a conversation task and the effect on anxiety, self-evaluations, and social performance were assessed. The experimental design is a powerful method of testing causal hypotheses.

Consistent with hypotheses, the use of self-focused attention and safety behaviours was associated with more anxiety, more critical self-evaluations, and more critical judgements by others. The effect was observed in adolescents both high and low in social anxiety symptoms, but only socially anxious youth reported engaging in these strategies in their day-to-day lives. It therefore appears that these processes are not only harmful in adolescents with elevated social anxiety, but they would also be problematic in others if they were to use them. Turning to self-imagery, we were able to impact on feelings of anxiety, self-appraisals, and objective social performance by manipulating the valence of the social self-image that participants (with elevated social anxiety symptoms) held in mind. The two experimental studies suggest that self-focused attention, safety behaviours, and negative self-imagery are causally related to social anxiety in adolescents and that they can be modified, and so they may be useful therapeutic targets like they are for adults with SAD.

Chapters 5 and 6 set out to answer Research Question 2, with a focus on measurement of social anxiety symptoms and social-anxiety related cognitions in adolescents. With Study 4 (Chapter 5), I established the validity and reliability of the English language self-report version of the LSAS-CA for the first time. Factor structure and measurement invariance across age and gender was observed. The LSAS-CA-SR is a particularly useful scale as it quantifies severity of social anxiety symptomatology and also provides a detailed topography of the patient's anxiety to guide treatment and so the study findings will have value to clinicians and researchers alike. Study 5 (Chapter 6) described

the adaptation of a measure of social anxiety related cognitions developed for adults (SCQ) for children and adolescents (CASCQ) and preliminary evaluation of its psychometric properties amongst a sample of adolescents from the general population. The study dovetails with a related piece of work (not included in the thesis) in which colleagues and I adapted an adult measure of safety behaviours for children and adolescents (Child & Adolescent Safety Behaviours Questionnaire [CASBQ]; Evans, Chiu, et al. (2021); Chiu et al. (2021a)). By creating a comprehensive set of psychometrically sound measures of the psychological processes relevant to the persistence of social anxiety in adolescents we can better understand how they operate and how they can be targeted in treatment. Along with the CASBQ, the measures appraised in Chapters 5 and 6 were used to guide treatment in the randomised controlled trial (RCT) of internet-delivered CT-SAD with young people and to examine preliminary questions about the mechanisms of action (Chapter 7).

Chapter 7 describes the first RCT of a therapist-assisted internet-delivered version of CT-SAD, with initial modifications made for adolescents (OSCA). Compared to waitlist, OSCA was associated with substantial improvements across all domains of symptoms and functioning that were assessed. These gains were maintained up to the 6-month follow-up assessment date. Exploratory mediation analysis indicated that the therapeutic improvement was in part mediated by key psychological processes (safety behaviours, social anxiety related cognitions, and social attitudes), a finding that is consistent with the underpinning Clark & Wells' cognitive model (Clark & Wells, 1995).

It is useful to consider the studies in this thesis and planned future studies within the recent MRC-NIHR Complex Intervention framework (Skivington et al., 2021). The framework sets out guidance on the development, feasibility/piloting, evaluation, and implementation of complex interventions, such as psychological therapies, to improve

health. The studies described in this thesis have primarily been concerned with the phases of developing and piloting the OSCA intervention. With regards the development phase, I synthesised existing evidence to determine the relevance of the Clark & Wells' theoretical account of social anxiety to adolescents and identify knowledge gaps (Chapter 2). Experimental studies (Chapters 3 & 4) then yielded further support for the theoretical account in adolescents. With regards the feasibility and piloting stage, in the preliminary RCT described in Chapter 7, I tested the acceptability of the treatment and trial procedures and generated an estimate of the likely size of the effect. An ancillary qualitative study (Leigh et al., in preparation) that sought the views of young people after receiving OSCA will provide richer information about the acceptability and feasibility of the programme (see Discussion section of Chapter 7). Looking ahead, future studies will focus on the latter phases mapped out in the MRC-NIHR Complex Intervention framework, namely evaluation and implementation (see Section 8.4.). Of relevance to this discussion is the development of the adult version of Cognitive Therapy for SAD, which has followed the full pathway of the Complex Intervention framework, from theory development through to implementation. CT-SAD for adults and its internet-delivered version (iCT-SAD) are now starting to be delivered in routine Improving Access to Psychological Therapies (IAPT) services nationally across England. After a large RCT showed that the adult iCT-SAD produced similarly large effects to those observed with CT-SAD (Clark et al., in preparation), use of iCT-SAD was piloted in 6 IAPT services. Excellent outcomes were achieved but it was also clear that the therapist interface needs to be enhanced to ensure NHS clinicians can get the most out of the programme within the time constraints of a busy service. This illustrates the fruitful way in later stages of the MRC framework might trigger further work in earlier stages, with the whole exercise being cyclical, rather than a one direction linear pathway.

8.2. Limitations

The limitations of the work presented in this thesis will be considered before examining theoretical and clinical implications and potential next steps. The most notable limitations of each study have been described in the preceding chapters, but I will focus here on key limitations common to many of the studies.

The age range of participants in the experimental studies was narrow (11-14 years). This decision was made given that neurocognitive processes relevant to the mechanisms of interest in the study, such as imagery manipulation, self-consciousness, and perspective-taking, are undergoing maturation across the adolescent phase (Caouette & Guyer, 2014). Recruitment of a wider age range would have introduced variability in the sample, impacting on the ability to detect effects in these initial experimental studies. In future, larger studies recruiting participants across the whole adolescent period and examining age-related effects more closely will be important. The reason I focused on the younger end of the adolescent phase in these experimental studies was to span the peak period of increase in social worries and social anxiety (Beesdo-Baum et al., 2012).

In contrast to the experimental studies, the age range of those included in the RCT in Chapter 7 was at the upper end of the adolescent phase (14-18 years). This preliminary trial examined internet CT-SAD for adolescents with only minimal adaptations made to the adult version, for example to language and case vignettes. One of the aims was to determine proof-of-principle for the use of the treatment with youth and to learn lessons about the more substantial adaptations that may need to be made for the adolescent population. The decision was therefore taken to focus on older adolescents with whom it was expected that fewer changes would be needed compared to younger adolescents.

The main outcome measures across all the studies were self-report, which introduces the possibility of common method variance, by which the observed associations

may be artificially inflated. The decision to use primarily self-report measures was partly driven by practicalities but also because for many of the processes (self-evaluations, anxious thoughts, perceptions of anxiety), I was primarily interested in the subjective experience of them. However, future studies would greatly benefit from inclusion of other informants (e.g., teacher and parent reports) as well as more objective measures such as behavioural tasks, eye tracking, pupillometry, and depth sensor imaging.

8.3. Theoretical Implications and Next Steps

With this thesis I adopted a stepwise approach to understanding adolescent SAD in relation to one particular cognitive behavioural maintenance model (Clark & Wells, 1995). The first step involved establishing whether the clinical phenomena were observed in adolescents. My systematic review summarised the correlational studies addressing this question (Chapter 2). The next step involved undertaking rigorous experimental studies to determine the extent to which the processes are causally implicated in adolescent social anxiety. The experimental studies in Chapters 3 and 4 provided strong preliminary evidence for this.

We are now ready to take the third step, which is to position our understanding of maintenance mechanisms within a developmental framework. When considering the downward application of a static adult model, such as the cognitive model of Clark & Wells (1995), to a dynamic adolescent period, there is a need to consider the developmental influences that have a bearing on these processes. For example, as individuals progress through adolescence we would expect that they may use different safety behaviours. Indeed, in a recent study with a community sample of adolescents, we found that older adolescents (aged 16-18 years) reported greater relative use of impression management safety behaviours compared to younger adolescents (aged 11-14 years)

(Evans, Chiu, et al., 2021). A possible explanation for this finding is that impression management safety behaviours such as '*checking that you come across well*' and '*trying to fit in and act normal*' are relatively sophisticated and require skills such as perspective taking and understanding emotional expressions that are developing during adolescence (Choudhury, Blakemore, & Charman, 2006). In contrast, 'avoidance' behaviours such as '*talking less*' and '*hiding your face*' seem unlikely to require the same level of social cognitive complexity.

Given that adolescence is associated with heightened self-consciousness (Cicchetti & Cohen, 2006), socially anxious adolescents may show especially intense self-focus in social interactions, but they may also be especially responsive to an attention training intervention. As no studies have yet directly examined these questions, I was interested to review the findings from Study 3 reported in this thesis, in which self-focused attention and safety behaviours were manipulated during a conversation task with adolescents, alongside those from a study that used a very similar design but with high socially anxious adults (McManus et al., 2008). Amongst the high socially anxious participants, the magnitude of the effect of self-focused attention and safety behaviours (compared to an external focus and dropping safety behaviours) on self-reported anxiety was large in both studies, but a larger effect (Cohen's $d = 1.51$) was observed in adolescents compared to in adults (Cohen's $d = 0.84$). It would be worthwhile to address this question more robustly by examining the effects across different age groups (e.g., pre-adolescents, early adolescents, late adolescents, adults) in a single study in the future.

Turning to mental imagery, given that the ability to generate, inspect, maintain and manipulate mental images develops in an extended fashion through childhood and adolescence (Burnett Heyes et al., 2013), socially anxious adolescents may be particularly vulnerable to distressing social imagery, finding it difficult to inhibit images or shift

attention away from them when they occur. But given this susceptibility, adolescents may also be particularly responsive to interventions targeting negative imagery. To begin to probe this possibility, I looked at the findings from Study 2 reported in the thesis, in which imagery was manipulated during a conversation task in high socially anxious adolescents, alongside those of Hirsch and colleagues (Hirsch et al., 2004) who used the same design but with high socially anxious adults. The magnitude of the effect of negative compared to benign imagery on state anxiety was larger with the younger compared to the older sample (Cohen's *d*: 2.38 vs. 2.04), in line with the suggestion that adolescents may be particularly sensitive to negative imagery. It would be valuable to examine this further in a single study across different age groups.

As well as considering the developmental influences of the processes specified in the adult model, the explanatory power of the model will be enhanced with consideration of environmental factors that are particular to adolescence and relevant to the persistence of social anxiety, such as peer processes, parental processes, and the school environment.

In adolescence, peer relationships become increasingly important. In a recent meta-analysis, we found that adolescent social anxiety is prospectively associated with lower peer friendship quality and more peer rejection and victimisation (Chiu et al., 2021b). In what ways might social anxiety increase susceptibility to peer problems? There are a number of possible psychological mechanisms to explain this association. Like 'moths to a flame', rather than seeking out friends with shared interests and values, socially anxious adolescents may seek acceptance from dominant peers in a bid to feel acceptable (Miers, Sumter, Clark, & Leigh, 2020). However, the mismatch in social status between the socially anxious individual and dominant peers means they are at risk of being rejected (Mikami, Lerner, & Lun, 2010). Another potential link between social anxiety and peer problems is that like a 'beg friend', the use of safety behaviours, such as copying others'

dress sense and agreeing with others' opinion to avoid negative judgement can elicit an unfriendly response (Evans, Chiu, et al., 2021). 'Missing the message' is a further possibility, by which the tendency to make negative interpretations of ambiguous social cues can lead socially anxious youth to respond to a neutral situation in an excessively meek, avoidant or hostile manner, inadvertently eliciting an unfriendly reaction (Miers et al., 2020). Studies examining these mechanisms will be important.

It seems likely that the relationship between parent and child anxiety, beliefs and behaviour is iterative and interactive (Rubin, Coplan, & Bowker, 2009). Parents will bring their own attitudes and assumptions to their parenting practices. These parental beliefs are likely to motivate particular parenting behaviours (Rubin et al., 2009). Parenting beliefs characterised by a heightened perception of threat in the social environment and/or appraisals relating to their child's vulnerability will most likely lead to anxiety about a child's ability to thrive in a social environment. As such parents may engage in overprotective or over-controlling behaviours to mitigate their concerns (Rubin, Nelson, Hastings, & Asendorpf, 1999). Whilst well intentioned, these behaviours may perpetuate the young person's perception of social threat. The behaviours will be a source of evidence to the young person that they are less socially able than their peers and thereby maintain their negative attitudes (Ollendick & Hirshfeld-Becker, 2002). Parental behaviours will become proxy safety behaviours for the young person. For example, a parent with these beliefs may step in and speak for their child or give them permission to avoid social situations. These actions will preclude the young person's opportunities to learn that their fears were unfounded or exaggerated. Some parents become constant companions to their teenage children. This could discourage the child's peers from approaching or engaging with them, and so directly maintain social isolation. It will be valuable to address these questions, for example using experience sampling and experimental methods.

In terms of classroom settings, we know that adolescent social anxiety is associated with later academic under attainment (Vilaplana-Pérez et al., 2020). A prospective study found that self-reported classroom concentration is a critical link between adolescent social anxiety and poor academic achievement (Leigh, Chiu, et al., 2021): socially anxious youth are typically self-conscious in the classroom which makes it hard to concentrate on the lesson and so limits their ability to make the most of learning opportunities. Related work found that another pathway to poor achievement is via reduced participation in class (Scanlon, Del Toro, & Wang, 2020). The findings from the RCT reported in Chapter 7 and the two case series of face-to-face treatment (Leigh, Creswell, et al., 2021; Leigh & Clark, 2016) all indicated that CT-SAD was associated with improved classroom concentration. Therefore, it is possible that CT-SAD not only improves social anxiety and related mental health outcomes but also enhances academic achievement. This could be tested in a suitably powered RCT with a sufficiently long follow-up to assess academic performance after treatment compared to a control condition. In addition, inclusion of measures of both classroom concentration and classroom participation could help identify the underlying therapeutic mechanisms.

The findings of the studies in this thesis have potential implications for understanding the aetiology of SAD and developing preventive interventions. In recent work, we have demonstrated that safety behaviours, social anxiety related cognitions, and self-focused attention are each independently predictive of prospective increases in social anxiety symptoms in a general adolescent sample (Chiu et al., 2021a). Future prospective studies could examine whether these processes also predict later incidence of SAD.

To date, my investigations have examined questions relating to the psychological mechanisms of SAD and treatment delivery in neurotypical populations. However, SAD is also common amongst those with neurodevelopmental disorders, and autism spectrum

disorders (ASD) in particular. Prevalence estimates of SAD as high as 50% in this population have been reported (Maddox & White, 2015; Bellini, 2004). There is therefore a need to ensure effective treatments for SAD are available for young people with neurodevelopmental disorders such as ASD.

One approach to this challenge is to determine the applicability of cognitive behavioural models of SAD, such as that of Clark & Wells, to an ASD population. However, at the moment little is known about the relationship between cognitive and behavioural maintenance factors of social anxiety and autistic traits in adolescents. I have begun to address this knowledge gap with colleagues researching ASD. For example, we are examining the construct overlap between safety behaviours in SAD and social camouflaging behaviours in ASD. Social camouflaging behaviours are the behavioural strategies autistic people use to 'mask' their autism, in order to appear 'normal' and 'fit in' with neurotypical individuals in social situations (Hull, Petrides, & Mandy, 2020; Hull et al., 2017). The project is exploring the extent to which both autistic and neurotypical adolescents engage in safety behaviours in relation to social anxiety versus behaviours used to camouflage their autism or autistic traits, as captured by conventional measures used in clinic and research to identify safety behaviours and social camouflaging. It is hoped that understanding the relationship between social camouflaging and impression management safety behaviours will enable clinicians to assess and formulate how maintenance factors identified in cognitive models of SAD for neurotypical adolescents are shared by autistic adolescents and adapt intervention accordingly.

Also of relevance to our understanding and treatment of SAD in adolescents with ASD are my findings that suggest that the apparent social skills deficits observed in neurotypical socially anxious adolescents are in fact the observable effects of safety behaviours (Evans, Chiu, et al., 2021). It is yet to be tested whether the social functioning

of adolescents with SAD and ASD can be improved by reducing safety behaviours such as self-monitoring, rehearsal, and censoring. Experimental studies will help to answer this question and could pave the way for the use of CT-SAD techniques with this population. An implication of this possibility is that CT-SAD could improve social functioning as well as alleviate anxiety in this population.

Another aspect to consider is if and how the format of internet-therapies, such as OSCA, may be suitable for an ASD population. There is good reason to think that they may be particularly suitable for this group. For example, a recent study found that therapy delivered remotely compared to face-to-face was associated with better engagement and attendance (Kalvin et al., 2021).

8.4. Implications for Clinical Practice and Next Steps

The most striking implication of the findings from this thesis is that, if confirmed in a definitive trial with an active comparator, treatment outcomes can be significantly improved for adolescents with SAD. This is important because SAD in youth is common (Kessler et al., 2005), persistent (Bruce et al., 2005), and associated with functional impairments and other mental health difficulties (Wittchen, Fuetsch, et al., 1999), and yet outcomes from the current established treatment are disappointing (Evans, Clark, et al., 2021). In some respects, this is surprising. Cognitive systems are more malleable in adolescence (Dahl, Allen, Wilbrecht, & Suleiman, 2018). This means that negative experiences can have a particularly strong impact, and indeed it has been suggested that this may be part of the explanation for the increased incidence of SAD during this time (Haller et al., 2015). But the flip side of this might be that it is reasonable to expect that strong corrective information of the sort provided in therapy might also have greater chance of producing positive change (Haller et al., 2015). Interestingly, the improvements

we achieve with CT-SAD for adolescents are even larger than those observed with adults. For example, the mean drop in LSAS-CA-SR from pre- to post-treatment was 72 points in the present trial of OSCA, 82 points in the preliminary case series of face-to-face CT-SAD with adolescents, and 56 in the case series undertaken in routine CAMHS. This compares to a mean drop of 46 points on the LSAS-SR seen with adults (Clark et al., 2006). Whilst improvements for both adults and adolescents are very large compared to what is achieved with other approaches, this perhaps further strengthens the case for early intervention.

An important next will therefore be to undertake a fully-powered RCT with an active comparator to establish the specificity of treatment effects. Inclusion of health economic measures will be important to establish the economic cost of OSCA. Ahead of this, though, we should consider two issues. First, what lessons we have learnt about further modifications that might be needed to OSCA to ensure it meets the needs of adolescents and second, whether it is suitable for delivery in the services in which adolescents with SAD are seen.

Findings from the RCT described in Chapter 7 are highly encouraging. However, the highly-specialist clinical psychologist delivering OSCA in the trial needed to make further adaptations to the treatment to ensure it was suitable for adolescents, in particular targeting two adolescent-specific factors: social anxiety in classroom settings and peer problems. Post-treatment qualitative interviews with participants in the trial (Leigh et al., in preparation) suggest the additions enhanced treatment: "*I needed the phone calls to get me practicing therapy tasks in class"* and "*The therapist helped me learn how to deal with the girls who were treating me badly".* The indication that these two factors may need to be targeted with adolescents also aligns with our other recent findings described in the section on 'Theoretical Implications and Next Steps' above. Taken together, the feedback from the trial and these strands of work suggests that there may be value in developing

new modules that explicitly target these factors to minimise reliance on therapist assistance and optimise effectiveness.

Co-design work has been critical to my work so far. Young patient/public involvement (PPI) input has supported the development/adaptation of measures of key intervention targets, of therapy materials, and of OSCA content. For example, as described in Chapter 6, a number of items were added to the adult version of the Social Cognitions Questionnaire, and I made changes to wording on other items to be more developmentally appropriate on the basis of consultation with PPI representatives. Likewise, as described in Chapter 7, initial modifications to OSCA were made on the basis of young PPI input. Further co-design work will help to maximise the acceptability and usability of OSCA to young people and families. For example, in qualitative interviews after my RCT (Leigh et al., in preparation), families told me that they wanted parent and adolescent smartphone applications (apps) that complement OSCA. A young person explained: "It will be a lot easier to stay on top of it [OSCA], to keep filling in as you go". A parent said: "I would have loved my own resource, like an app, so I could understand what she was doing in therapy without interfering." The adolescent app will sync with OSCA and support key treatment components, e.g., providing cues to become externally focused, reminders to complete behavioural experiments, the facility to record behavioural experiments, and bite-sized videos summarising key techniques. The parent app will run separately and provide information about treatment and advice on how to support their child. It will be important to develop these new adolescent and parent apps with a co-design approach, to ensure they meet the needs of the users.

Globally, there is a drive towards treating adolescents with common mental health problems such as SAD in schools (Patalay et al., 2016). For example, in England, the government established Mental Health Support Teams in 2017, intended to provide brief

psychological therapies to adolescents. At present, according to NHS England, they serve 15% of pupils, increasing to 35% in 2023 and many more in the future. Currently practitioners in these kinds of services are trained to deliver exposure-based CBT for treatment of adolescent anxiety problems (including SAD), which we know is sub-optimal for the treatment of SAD (Evans, Clark, et al., 2021). OSCA could offer an alternative, more effective treatment in these services. However, compared to the highly-specialist clinical psychologist who provided the therapist-assistance for OSCA in the trial, the practitioners in school settings who typically treat adolescents with SAD receive relatively little training. Whilst OSCA includes most of the therapy content, it does rely on support from a therapist, for example to generalise learning from behavioural experiments and to select modules to personalise treatment, and it is possible that the excellent RCT outcomes were in part due to the involvement of the highly-specialist therapist. There is therefore a need to ensure the treatment and training can be delivered easily in schools-based services and establish whether similar outcomes can be achieved in these settings. This work could involve consultation with service and training leads to ensure that an OSCA training programme fits into existing programmes and that OSCA can be integrated into existing working pattern.

8.5. Conclusions

My thesis was motivated by a desire to advance our understanding of the psychological mechanisms of adolescent SAD and to improve outcomes for the many young people and families who are affected by the condition. The rapid rate of development of well-validated theoretical psychological models of adult anxiety disorders, such as SAD, and the associated development of accessible treatments has revolutionised outcomes for adults with anxiety disorders. This stands in contrast to the outlook for young people, for whom

there remains a lack of explanatory models of specific anxiety problems, such as SAD. Yet effective prevention and early intervention of common mental health problems would significantly benefit individuals, services, and society. The studies I describe in this thesis reflect the strategy of closely interweaving experimental and clinical studies to better our understanding and develop effective and scalable treatments for social anxiety disorder in adolescents. With this work, I have found support for the causal role of the psychological processes invoked in the Clark and Wells' cognitive model of social anxiety in adolescents as well as adults, established the psychometric properties of self-report measures of social anxiety symptoms and social-anxiety related cognitions for research and clinical endeavours, and provided preliminary support for the efficacy of a therapist-assisted internet-delivered psychological therapy for adolescent social anxiety disorder. Looking ahead this approach could be applied more widely to the development of prevention and treatment interventions for many common mental health problems in young people.

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APPENDICES



CONSORT 2010 checklist of information to include when reporting a randomised trial

Section/Topic	Item No	Checklist item	Reported on page No
Title and abstract			
	1a	Identification as a randomised trial in the title	139
	1b	Structured summary of trial design, methods, results, and conclusions (for specific guidance see CONSORT for abstracts)	NA
Introduction			
Background and objectives	2a	Scientific background and explanation of rationale	139-140
	2b	Specific objectives or hypotheses	140
Methods			
Trial design	3a	Description of trial design (such as parallel, factorial) including allocation ratio	141
	3b	Important changes to methods after trial commencement (such as eligibility criteria), with reasons	154
Participants	4a	Eligibility criteria for participants	141-142
	4b	Settings and locations where the data were collected	141-142
Interventions	5	The interventions for each group with sufficient details to allow replication, including how and when they were actually administered	143-144
Outcomes	6a	Completely defined pre-specified primary and secondary outcome measures, including how and when they were assessed	147-149
	6b	Any changes to trial outcomes after the trial commenced, with reasons	NA
Sample size	7a	How sample size was determined	141
	7b	When applicable, explanation of any interim analyses and stopping guidelines	NA
Randomisation:			
	8a	Method used to generate the random allocation sequence	143

Sequence generation	8b	Type of randomisation; details of any restriction (such as blocking and block size)	143
Allocation concealment mechanism	9	Mechanism used to implement the random allocation sequence (such as sequentially numbered containers), describing any steps taken to conceal the sequence until interventions were assigned	143
Implementation	10	Who generated the random allocation sequence, who enrolled participants, and who assigned participants to interventions	143
Blinding	11a	If done, who was blinded after assignment to interventions (for example, participants, care providers, those assessing outcomes) and how	158
	11b	If relevant, description of the similarity of interventions	NA
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	12b	Methods for additional analyses, such as subgroup analyses and adjusted analyses	151-153
Results			
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	13b	For each group, losses and exclusions after randomisation, together with reasons	155-156
Recruitment	14a	Dates defining the periods of recruitment and follow-up	142
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Baseline data	15	A table showing baseline demographic and clinical characteristics for each group	157
Numbers analysed	16	For each group, number of participants (denominator) included in each analysis and whether the analysis was by original assigned groups	161; 155
Outcomes and estimation	17a	For each primary and secondary outcome, results for each group, and the estimated effect size and its precision (such as 95% confidence interval)	164
	17b	For binary outcomes, presentation of both absolute and relative effect sizes is recommended	166
Ancillary analyses	18	Results of any other analyses performed, including subgroup analyses and adjusted analyses, distinguishing pre-specified from exploratory	167
Harms	19	All important harms or unintended effects in each group (for specific guidance see CONSORT for harms)	NA
Discussion			

Limitations	20	Trial limitations, addressing sources of potential bias, imprecision, and, if relevant, multiplicity of analyses	173
Generalisability	21	Generalisability (external validity, applicability) of the trial findings	169-172
Interpretation	22	Interpretation consistent with results, balancing benefits and harms, and considering other relevant evidence	169-172
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Registration	23	Registration number and name of trial registry	141
Protocol	24	Where the full trial protocol can be accessed, if available	Appendix
Funding	25	Sources of funding and other support (such as supply of drugs), role of funders	Appendix

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Understanding Social Anxiety Disorder in Adolescents and Improving Treatment Outcomes: Applying the Cognitive Model of Clark and Wells (1995)

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Abstract
Social anxiety disorder is a condition characterised by a marked and persistent fear of being humiliated or scrutinised by others. Age-of-onset data point to adolescence as a developmentally sensitive period for the emergence of the condition, at a time when the peer group becomes increasingly important. Social anxiety in adolescence is associated with considerable impairment that persists through to adulthood. There are clear potential benefits to delivering effective interventions during adolescence. However, there is limited evidence on the specific efficacy of available therapies. This is in contrast to adults, for whom we have interventions with very specific treatment effects. One such treatment is individual cognitive therapy. Cognitive therapy is based on the cognitive model of social anxiety proposed by Clark and Wells (in: Heimberg, Leibowitz, Hope, Scheiber (eds) Social phobia: diagnosis, assessment and treatment, The Guilford Press, New York, 1995). The present review examines the potential application of this adult cognitive model to the understanding of adolescent social anxiety and considers additional adolescent-specific factors that need to be accommodated. It is suggested that a developmentally sensitive adoption of the cognitive model of social anxiety disorder (Clark and Wells 1995) for adolescents may lead to better treatment outcomes.

Keywords Social anxiety disorder · Adolescents · Young people · Cognitive model · Cognitive therapy · Psychological therapy

Introduction

Social anxiety disorder (SAD) is a debilitating condition characterised by a marked and persistent fear of being humiliated or scrutinised by others (World Health Organization 1992; American Psychiatric Association 2013). Individuals fear a range of social interactions, such as conversations with strangers, joining in groups or speaking on the telephone. Most things that involve being observed by others are difficult. These include walking into a room when other people are already seated, eating or drinking in public, and performing in front of an audience. Sufferers fear that they will say or do something that they believe will be humiliating or embarrassing. Common concerns include the fear of sweating, shaking, blushing, stumbling over words, looking anxious, or appearing boring, stupid, or incompetent (Stein and Stein 2008).

Social anxiety disorder is the third most common mental health disorder after depression and substance abuse, with lifetime prevalence rates of around 12% (Kessler et al. 2005). It is common in young people. Prevalence rates of around 10% have been reported by the end of adolescence in US and New Zealand samples (Burstein et al. 2011; Merikangas et al. 2010; Feehan et al. 1994). Social anxiety disorder persists in the absence of treatment (Bruce et al. 2005; Reich et al. 1994a, b). For example, Bruce et al. (2005) reported findings of a US-based community study in which adults with various anxiety disorders were followed up for 12 years. At the start of the study, individuals had suffered with social anxiety disorder for 19 years on average, and over the next 12 years only 37% recovered. This is compared with recovery rates of 58% for generalised anxiety disorder

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and 82% for panic disorder without agoraphobia. Remarkably similar findings have been reported in adolescent samples. A 10-year prospective community study with over 3000 German adolescents and young adults (aged 14–24 years) (Beesdo-Baum et al. 2012) found that 57% of those with social anxiety disorder at the start of the study were still reporting at least symptomatic social anxiety at follow-up and higher persistence of social anxiety was significantly predicted by an earlier age of onset of the disorder. Only 15% were completely remitted.

Social anxiety disorder is associated with profound negative consequences and high levels of impairment even when compared to other psychiatric disorders (Alonso et al. 2004). Social anxiety disorder affects all areas of life. For adolescents, academic attainment is curtailed, with individuals at risk of leaving school early and obtaining poorer qualifications (Van Ameringen et al. 2003). Amongst a sample of 784 Finnish 13–17-year olds, those with clinical or subclinical social anxiety disorder had a lower grade point average compared to those with no diagnosis (Ranta et al. 2009). Social relationships are inevitably particularly challenging for socially anxious adolescents. They report having fewer friends, and the peer and romantic relationships they do have are of poorer quality (La Greca and Harrison 2005; Hebert et al. 2013). They are more likely to be victims of bullying (Acquah et al. 2016; Ranta et al. 2009). Social anxiety makes day-to-day life difficult, for example, shopping and using the telephone can be a challenge. Research with adults demonstrates that the impairments associated with social anxiety disorder persist into adulthood. Employment is affected: although the majority of adults with social anxiety disorder are employed, they take more days off and report lower productivity due to their symptoms (Stein and Kean 2000). In terms of close relationships, adults with social anxiety disorder are less likely to marry, more likely to divorce and less likely to have children (Wittchen et al. 1999a). A study amongst adults seeking treatment for social anxiety disorder found that the functional impairment was not due to the presence of comorbid mood or anxiety disorders (Aderka et al. 2012).

Adolescence and the Development of Social Anxiety Disorder

Social anxiety is very much a disorder with its origins in adolescence, with the majority of cases occurring during this period (90% occur by the age of 23 years; Kessler et al. (2005)). Prospective, longitudinal studies suggest that it is relatively unusual in early childhood (Wittchen et al. 1999b), with incidence increasing through the adolescent years and a median age of onset of 13 years (Kessler et al. 2005). After this peak period of onset, new cases are fairly rare after about the age of 25 years (Heimberg et al. 2000). The increased incidence of social anxiety disorder during adolescence is perhaps unsurprising. Adolescence is a time when people are moving from a unique reliance on their family unit and are learning how to interact with peers in a way that will set them up for the rest of their life. They become increasingly autonomous from their parents and reliant instead upon their peer group (Larson and Richards 1991).

Underpinning this social reorientation is the development of particular neurocognitive abilities (Kilford et al. 2016). One of these is self-consciousness. Self-consciousness is the directing of attention inwards, with both a private and public dimension (Davis and Franzoi 1999). Private self-consciousness refers to an awareness of one's inner thoughts and feelings, whilst public self-consciousness is an awareness of the self as a social object. Self-consciousness, and particularly the public aspect of it, is thought to peak in early adolescence (Cicchetti and Cohen 2006; Rankin et al. 2004; Vartanian 2000). The development of public self-consciousness will enhance adolescents' sensitivity to how they are being perceived by others. This awareness will inform how adolescents behave towards other people and will help them to establish more mature and enduring relationships with their peers. However, it seems very plausible that an acute awareness of the self as a social object may also confer vulnerability for increased social anxiety and in line with this suggestion, public self-consciousness has been found to be related to social anxiety in adolescents (Mallet and Rodriguez-Tomé 1999) and in adults (Mor and Winquist 2002). Although all young people seem to experience a normative increase in public self-consciousness in early adolescence, only a small proportion will develop persistent social anxiety, and so it is not in itself enough to explain the increased incidence. Rather, self-consciousness may be a necessary precursor implicated in the development and maintenance of social anxiety (Tillfors and Van Zalk 2015). It seems plausible that the acute self-consciousness experienced during early adolescence renders this a developmentally sensitive period for the emergence of social anxiety (Haller et al. 2015).

As well as heightened self-consciousness, adolescence is also normally a period of strong sensitivity to peer influence and it is a crucial phase of social learning. Social relationships during adolescence are especially rewarding during this time, and it has been suggested that this increases the impact of both positive and negative aspects of social interactions (Kilford et al. 2016). In line with this, studies consistently demonstrate that peer rejection leads to increased distress, anxiety and lower mood in adolescents compared to children and adults (Platt et al. 2013). The heightened emotional salience of peer interactions means adolescents are primed to prioritise the development of social networks, but for some it will also

bring about an increased vulnerability for the emergence and maintenance of social fears (Eldreth et al. 2013).

In adulthood we pay attention to what others think, but there is a certain resistance to peer influence. In contrast during adolescence, this resistance is far weaker, with young people showing a strong susceptibility to peer influence. This can present as conformism to trends. A study examining the effects of peer influence on risk taking in adolescents and peers bears this suggestion out (Gardner and Steinberg 2005). When playing a driving-based video game, youths took significantly more risks when with peers than when alone, whereas adult risk-taking behaviour was not affected by the presence of peers. Studies looking at resistance to peer influence are consistent with this finding. At the beginning of adolescence, this resistance is low and only gradually increases to adult levels (Steinberg and Monahan 2007). Susceptibility to peer influence in adolescence is likely to be adaptive, as it will provide the opportunity to form strong social bonds and learn vital lessons about relationships. However, it is also like to represent a developmental sensitivity for the emergence of social fears.

As this brief discussion highlights, adolescence ushers in a host of changes at various levels including in neural circuitry, information processing and the social environment (Blakemore 2008). For the majority of adolescents, one of the consequences of these changes is a short-lived increase in social fears (Weems and Costa 2005). But for a subset, perhaps those who are more behaviourally inhibited by temperament, it has been proposed that these cognitive, brain maturational and social changes confer vulnerability for the development and also the maintenance of social anxiety disorder (Caouette and Guyer 2014). With this in mind, any theoretical accounts that aim to explain the persistence of social anxiety in adolescence need to be positioned within a developmental context. In other words, it is necessary to take into account developmental influences on maintenance processes that are relevant across the lifespan, as well as considering processes that may be unique to the adolescent period.

When considering treatment, it is clear that understanding and intervening in social anxiety disorder in adolescence is vital in order to avert long-term consequences. But in addition to this, the plasticity associated with adolescence may also offer a 'window of opportunity' in which to provide particularly potent interventions (Haller et al. 2015).

Current Treatments for Social Anxiety Disorder in Adolescents

Traditionally, cognitive behavioural therapies (CBT) did not target specific anxiety disorders in young people. Instead, social, separation and generalised (or overanxious) anxiety disorder were all treated with the same set of techniques. Creswell et al. (2014) suggest this approach was motivated by two principal factors. Firstly, the high comorbidity amongst the anxiety disorders in children and young people and secondly, the lack of well-validated disorder-specific maintenance models. The most well-known examples of the 'generic' CBT approach are 'Coping Cat' for children (Kendall and Hedtke 2006) and the 'CAT Project' for adolescents (Kendall et al. 2002). The treatments usually comprise 16 sessions and involve a combination of psycho-education, anxiety management strategies and graded exposure. There have been many large randomized controlled trials undertaken examining the effectiveness of Coping Cat and its various relations in treating separation, social and generalised anxiety disorder (e.g. Ginsburg et al. (2011), Walkup et al. (2008)). Meta-analyses have shown that these treatments are associated with substantial effect sizes (Bennett et al. 2013). However, a number of studies have shown that outcomes from generic CBT are less good for young people with SAD compared to those with other anxiety disorders. Young people (mixed child and adolescent samples) with SAD are significantly less likely to lose their diagnosis of SAD after treatment compared with young people with other anxiety diagnoses (Crawley et al. 2008; Ginsburg et al. 2011; Hudson et al. 2015a, b; Lundkvist-Houndoumadi and Thastum 2017; Kodal et al. 2018).

As well as traditional generic CBT, psychological therapies designed specifically for social anxiety disorder have been developed. Cognitive behavioural group therapy (CBGT; Albano et al. (1995)) was one of the first to be tested. This treatment, based on the Heimberg model (Rapee and Heimberg 1997), involves psycho-education and skills training (social skills and anxiety management strategies) followed by exposure tasks (Albano and DiBartolo 2007). In an early randomized controlled trial (RCT), CBGT was compared to no treatment amongst female adolescents (Hayward et al. 2000). The authors note that whilst those in the CBGT group showed significantly greater reductions in social anxiety symptoms compared to the no treatment group post-treatment, they continued to report considerable residual symptoms and at one-year follow-up the control group had also improved and there was no longer a significant group difference. Herbert et al. (2009) did not find evidence for specific treatment effects of CBGT in an RCT comparing the treatment to an educational supportive therapy amongst adolescents, with both treatments associated with an improvement in social anxiety symptoms, functioning and social skills.

Social Effectiveness Therapy (SET; Turner et al. (1994)) and its parallel version for 8–12-year olds Social Effectiveness Therapy for Children (SET-C; Beidel et al. (2000)) is another SAD specific treatment. It is a behavioural group treatment comprising psycho-education, social skills

Table 1 Summary of what does and does not happen in cognitive therapy for social anxiety disorder

What happens in cognitive therapy
Focuses on targets specified in Clark and Wells (1995) model
Personal version of model
Experiential exercise to demonstrate adverse effects of self-focused attention and safety behaviours
Video (and still) feedback to correct negative self-images
Attention training to promote external focus
Behavioural experiments to test patients' fearful predictions in social situations whilst dropping safety behaviours and/or enacting feared outcomes
Surveys to discover other people's view of feared outcomes
Memory work (discrimination training and memory rescripting) to reduce impact of early social trauma
What does not happen in cognitive therapy
Repeated exposure to promote habituation
Exposure hierarchies
Rating anxiety in feared situations (SUDS)
Thought records
Rehearsal of rationale responses in social situations (self-instruction)
Social skills training

training and exposure. Baer and Garland (2005) adapted the treatment for adolescents and compared it to waitlist in a pilot RCT with 12 adolescents. SET-C outperformed waitlist based on clinician- and self-report of symptoms. Olivares et al. (2002) compared SET-C and CBGT to a waitlist control using a quasi-experimental design (participants were allocated to group according to their school timetables; random allocation was not used). Both active treatments yielded significantly better self- and clinician-rated improvements compared to waitlist with no differences between the two, and gains were maintained at 5-year follow-up (Garcia-Lopez et al. 2006).

Masia-Warner and colleagues (2001) adapted SET-C for an adolescent schools-based population, and they have tested the treatment, Skills for Academic Success (SASS) in two RCTs. Compared to waitlist control, SASS led to significantly greater improvements in social anxiety, functioning and social skills based on self-report, parent-report and clinician-report (Masia-Warner et al. 2005). Examining specific treatment effects, the authors compared SASS with an attention control which involved psycho-education and supportive therapy (Masia-Warner et al. 2007). Findings showed significantly greater improvement in clinician-report and self-report but not parent-report of social anxiety after SASS compared to the comparison, suggesting preliminary evidence for treatment specificity. Whilst results from these two studies are very encouraging, because SASS was designed to be a low-intensity school-based intervention, the findings may not be directly relevant to the treatment of clinically referred adolescents.

Overall, the literature on specific CBT-based interventions for social anxiety disorder in *adolescents* show that a number of interventions are effective compared to no treatment; however, only one study has provided evidence for treatment specificity, in the sense of being superior to other credible interventions.

Improving Treatment Outcomes

In contrast to the limited evidence for treatment specificity in adolescents, substantial evidence for specific treatment effects has been observed in adults (Mayo-Wilson et al. 2014), including CBT treatment based on the Heimberg model (Rapee and Heimberg 1997). The version of CBT for adults that has the most evidence for treatment specificity is a specialised form of individual cognitive therapy, developed to target the cognitive abnormalities and maintenance processes specified in the Clark and Wells (1995) model of social anxiety disorder. Whilst there is overlap between this model and other cognitive behavioural models of social anxiety (Wong and Rapee 2016) and the treatment has similarities to some other CBT approaches, many of the techniques are distinct. This can be seen in Table 1 which summarises what does and does not happen in cognitive therapy for social anxiety disorder.

Cognitive therapy based on the Clark and Wells (1995) has been compared to a number of other active treatments, and in the six randomized controlled trials that have been undertaken it has been shown to be superior to: Group CBT (Stangier et al. 2003; Mörtberg et al. 2007), exposure therapy (Clark et al. 2006), interpersonal psychotherapy (Stangier et al. 2011), psychodynamic psychotherapy (Leichsenring et al. 2013), fluoxetine (Clark et al. 2003), medication-based

treatment as usual (Mörtberg et al. 2007) and pill placebo (Clark et al. 2003). Therapy based on the Clark and Wells (1995) model is one of the two first-line treatments recommended by the National Institute for Health and Care Excellence (NICE 2013), an independent body that synthesises available research evidence to develop treatment guidelines [the other recommended treatment being individual CBT based on the Heimberg model (1997)].

Such consistent and broad evidence for treatment specificity is unusual and suggests that it might be profitable to investigate whether the Clark and Wells' (1995) model applies to adolescent social anxiety disorder as well as the adult condition. If the model does apply to adolescents, then a treatment that rather single-mindedly focuses on the maintenance factors specified in the model may be helpful for this population. Certainly, this type of approach, in which interventions are very tightly tied to known maintenance factors, has proved successful as a strategy for developing effective forms of CBT for a range of anxiety-related conditions in adults (Clark 2004).

Clark and Wells' Cognitive Model of Social Anxiety in Adults

Socially anxious individuals will face many social situations every day, and the vast majority of these are benign, so why does social anxiety persist? A number of cognitive accounts have been put forward to try to explain this (Clark and Wells 1995; Heimberg et al. 2010; Hofmann 2007; Rapee and Heimberg 1997). There is considerable overlap amongst these models, for example they all highlight the importance of fear of negative evaluation and of self-focused attention in maintaining social anxiety. A useful review of the prominent cognitive behavioural models including a description of their commonalities and differences is provided by Wong and Rapee (2016).

According to the cognitive model developed by Clark and Wells (1995), people with social anxiety hold firm beliefs about the importance of making a good impression to others, but they also believe they come across badly (Leary 2001). Broad unconditional beliefs such as 'I am weird' lead them to make assumptions about themselves and their social environment. These usually involve high self-expectations ("I must always look cool and calm") and conditional beliefs about their social behaviour ("If I look at all anxious people will think I am a gibbering wreck") (Wong and Moulds 2011). These negative beliefs are activated in social settings and understandably trigger alarm (Hofmann 2007). The sense of threat then motivates a chain of cognitive, affective and behavioural responses. This chain of responses is self-perpetuating and closed off to new information. Several inter-linked processes are emphasised in the model: a shift to an internal focus of attention and the use of internal information to infer how one appears to others (collectively described as 'processing of the self as a social object'); safety behaviours; and worry and rumination that occur before and after the social event. These are described in more detail below, and the model is displayed in Fig. 1.

First, the model suggests that when individuals enter a social situation their attention will shift to a predominantly internal focus, in order to closely monitor how they are coming across. One of the reasons that this self-focused attention is problematic is because it reduces the opportunity for the individual to process the social situation and other peoples' reactions. As a result, individuals often fail to observe that other people are responding to them in a broadly benign manner. Another consequence of the shift to an internal focus of attention is an increased awareness of feared sensations.

Second, the model proposes that individuals use internally generated information to create an impression of how they appear to other people. The information drawn upon includes feelings of anxiety and negative self-imagery. Individuals will often overestimate how anxious they look, because they are assuming that they look as anxious as they feel (for example, 'I feel hot therefore I must be really red in the face'). Negative images are common. Images usually come to mind from an observer perspective rather than a personal (or field) viewpoint, and so it is natural that the images are assumed to be an accurate representation of how the individual looks to other people.

Third, the use of safety behaviours, which are motivated by the desire to prevent or minimise the consequences of feared outcomes (such as sounding stupid or blushing), further maintains social anxiety and negative social beliefs. Common safety behaviours in social anxiety include avoiding eye contact, preparing topics of conversation in advance, wearing lots of make-up, and agreeing with others. Safety behaviours are unhelpful for a number of reasons. They prevent the individual from discovering that the feared outcome was very unlikely to happen anyway. For example, 'the only reason no-one spotted me blushing was because I was wearing thick foundation' (rather than because it was not particularly obvious to others anyway). Safety behaviours can heighten self-focus and monitoring, as an individual checks that the safety behaviours are 'working'. Safety behaviours can directly cause feared symptoms. For example, covering your cheeks to prevent blushing can make you hotter and cause flushing. Safety behaviours can make one appear withdrawn and unfriendly. Behaviours such as avoiding eye contact or keeping conversations short can contaminate the social interaction and give the impression that one is not interested. Finally, safety behaviours can draw attention to feared behaviours. For example, speaking very quietly may

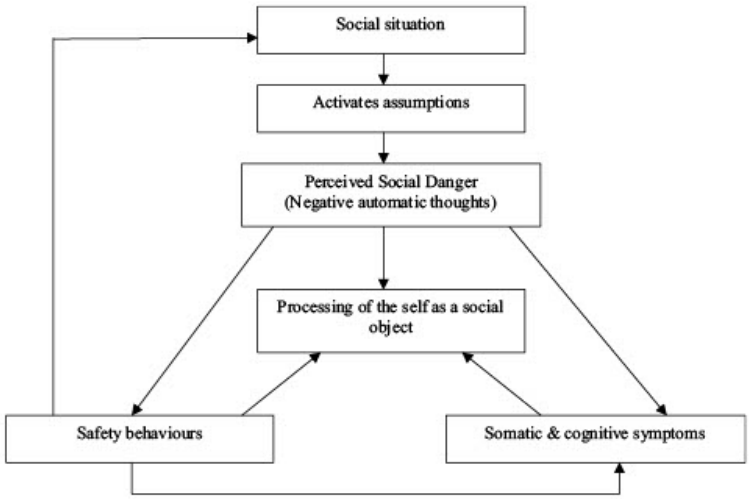


Fig. 1 Cognitive model of social anxiety disorder (Clark and Wells 1995)

cause others to lean in and pay especially close attention in order to hear what is said.

Safety behaviours comprise a broad range of overt behaviours and mental operations. Some safety behaviours involve avoidance, such as speaking less and avoiding eye contact, whilst others are concerned with making a good impression, for example checking you are coming across well and preparing topics in advance. Whilst it is suggested that both groups of safety behaviours are unhelpful as they prevent disconfirmation of negative beliefs and increase anxiety, only avoidance behaviours contaminate the social situation by making the individual appear withdrawn and unfriendly. Three studies have provided support for the distinction between avoidance and impression management safety behaviours. Plasencia et al. (2011) conducted a factor analysis of data from the Social Behaviour Questionnaire which confirmed the existence of the two factors. In addition, correlational analyses indicated that both sets of safety behaviour appear to maintain social anxiety, but only the avoidance behaviours had a negative effect on other people. In an earlier study, Hirsch et al. (2004) examined correlations between subsets of items of the Social Behaviour Questionnaire and a questionnaire measuring the quality of a conversation as rated by the conversation partner. They found that items assessing avoidance behaviours were significantly correlated with negative ratings of the conversation, whilst items assessing impression management behaviours were not. Extending these correlational studies, a recent experimental study (Gray and Clark submitted) directly manipulated the use of safety behaviours during a conversation task. The pattern of results was as expected, with use of both safety behaviour types increasing anxiety, but only avoidance behaviours resulting in a negative response from the conversation partner.

Further unhelpful processes include anticipatory worry and post-event processing. Before a social event, individuals with social anxiety will review what they think is going to happen in detail. Negative predictions will prevail and are associated with anxiety and a host of memories of past failures and negative self-images. This worry is often enough to stop someone entering a social situation in the first place. If they do manage to go, they will be cued up to interpret social failings. Despite some brief relief on leaving a social situation, socially anxious individuals often describe a continued cycle of negative thoughts and distress. Due to the inherently ambiguous nature of most social situations, it is rare that people receive an unquestionable seal of social approval. This ambiguity will usually equate to doubt for the socially anxious individual and in turn initiates a 'post-mortem'. Post-mortems involve detailed revisiting of the previous event. However, because attention is trained internally during social events, and the focus is on negative thoughts, feelings and images, it is this that is reviewed in detail (especially the most distressing moments), rather than the objective facts of the event. As a result, the event will most likely be labelled a failure. Intense humiliation and shame commonly run alongside these ruminative thoughts. The post-mortem process can continue for days and sometimes weeks after an event.

We suggest that the cognitive model of Clark and Wells (1995) has the potential to be a good fit for an adolescent population. For example, self-focused attention is emphasised in this model and it is a construct that has clear parallels with self-consciousness (Stein 2015) which is heightened during adolescence. Likewise, the concept of safety behaviours, which is emphasised in the model, may be pertinent to a teenage population. Avoidant safety behaviours may elicit particularly negative responses amongst adolescent peers, who as a group are especially sensitive to perceived peer rejection compared to children and adults (see Kilford et al. (2016) for a review). The rest of this review article is therefore concerned with two main questions. First, what evidence is there to support the application of the cognitive model of Clark and Wells (1995) to adolescents? And second, what are the developmentally specific processes that need to be considered for the successful application of the model? We note that quite a few of the maintenance processes that we discuss are highlighted in other prominent models, particularly the model of Rapee and Heimberg (1997), but those models also emphasise some other processes that are not included in this review.

A Review of Studies Examining the Applicability of the Cognitive Model to Adolescents

Methodology

We describe a review undertaken to assess the available evidence in relation to the cognitive model of Clark and Wells (1995) in adolescents. The studies we are interested in focus on the *maintenance* of social anxiety rather than the development or aetiology of the disorder. That is not to say that it is not valuable and important to understand the genesis of social anxiety disorder in young people. Rather, we are concerned here in delineating the mechanisms by which social anxiety is maintained in adolescents as a route to developing targeted and effective therapeutic interventions. Studies including young people aged 11–18 years are included. This age range was selected for two reasons. First, we are interested in the adolescent period because this is a peak period of onset of SAD. Second, whilst a definition of adolescence as defined by years is arbitrary because the on- and off-set of puberty will vary from individual to individual, we selected the upper and lower limits of 11 and 18 years as these coincide with the start and end of secondary school in many countries. Studies with a lower age limit below 11 years were retained if the average age was at least 12 years. We included data on non-clinical as well as clinical populations. As noted by Stopa and Clark (2001), social anxiety is continuously distributed in the general population and so comparing (non-clinical) individuals at the relatively high and low ends of a measure of social anxiety seems a meaningful way of researching psychological processes implicated in social anxiety.

We searched the databases PsycINFO and WoK for peer-reviewed articles written in English published between 1995, and the date the search was conducted (28 November 2017). The following search terms were used: *(social* AND (anxiet* OR anxious* OR phobi*)) AND ((cognitive AND model) OR (wells AND clark) OR (cognit* OR assumption* OR (interpretat* AND bias) OR belief*) OR image* OR (safety AND behav*) OR (self AND focus* AND attention*) OR ((event AND processing) OR worry OR worri* OR ruminat*)) AND (teen* OR adolescen* OR young OR youth*)*. To be included studies had to include adolescent samples in which social anxiety symptoms had been assessed as well as at least one of the psychological variables specified in the cognitive model of Clark and Wells (1995). Review papers, studies evaluating measures and scales, and treatment studies were excluded. A PRISMA flowchart showing the selection of papers is presented in Fig. 2. Twenty-five studies are included in the final review (please see Table 2 for a full list of included studies).

Effect sizes (ES) are provided. These are either reported directly from studies (where provided), or we have calculated these if they were not reported. For studies involving correlational analysis we have reported *r* and for group differences studies we have reported Cohen's *d*. *r* is interpreted according to Cohen's (1988) criterion whereby a small effect is at least 0.1, a medium effect is of a magnitude of at least 0.3, and an effect size greater than 0.5 is deemed large. Cohen's *d* is interpreted as such: at least 0.2 is a small effect, at least 0.5 is a medium effect, and at least 0.8 is a large effect.

Negative Cognitions and Perceived Social Danger

Negative Social Attitudes and Cognitions

According to the cognitive model, individuals with social phobia hold dysfunctional assumptions about themselves that are activated in anticipation of a social situation ("I must always speak eloquently"). Negative social cognitions about oneself (e.g. "I will stutter") and about other peoples' reactions ("people will think I'm stupid") predominate. Supportive evidence for this hypothesis in adolescents is provided by three questionnaire studies. Schreiber et al. (2012) and Hodson et al. (2008) reported on studies undertaken with German (aged 14–20 years) and UK (aged 11–14 years) school samples respectively. In their large non-clinical sample of 581 adolescents and young adults, Schreiber et al. (2012) found that those

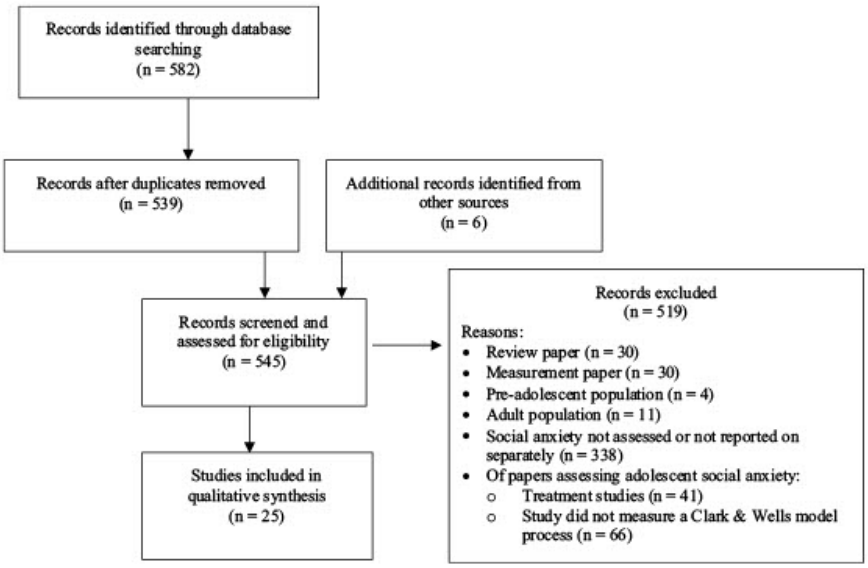


Fig. 2 Flow diagram showing selection of papers

scoring in the upper quartile of the German version of a measure of social anxiety, the Social Phobia Anxiety Inventory (SPAI; Turner et al. (1989)) endorsed more frequent negative social cognitions in social situations (e.g. 'I am boring', 'I will blush') on the Social Cognitions Questionnaire (Clark 2003). In the only study to look at negative social attitudes, the authors also found that those scoring in the top quartile on the SPAI rated themselves more highly on negative social attitudes (e.g. 'I must be witty and intelligent at all times') on the Social Attitudes Questionnaire (Clark 2003) compared to those in the lower quartile. Effect sizes were large for both findings; $d = 1.56$ and 1.74, respectively. In regression analyses, both social cognitions and social attitudes were significant independent predictors of social anxiety across the whole sample, but they were also predictors of depression. Similarly, the smaller UK study with 171 non-clinical adolescents (Hodson et al. 2008) found that those scoring in the top quartile on the Social Phobia Anxiety Inventory for Children (SPAI-C; Beidel et al. (1995)) reported more frequent negative social cognitions on the Social Cognitions Questionnaire compared to those in the middle quartiles ($d = 1.20$) and the lowest quartile ($d = 1.40$). The 'middle' and 'low' groups did not differ from each other ($d = 0.39$). Also in line with the findings of Schreiber and colleagues, regression analyses indicated that social cognitions were a significant independent predictor of both social anxiety and depression. In the third questionnaire study, Rudy et al. (2014) examined self-report questionnaire measures of negative social cognitions, self-efficacy and social anxiety in a US sample of 260 healthy adolescents aged 8–16 years. Negative social cognitions (e.g. 'I sound stupid') were associated with social anxiety both directly ($r = 0.66$) and indirectly via their effect on self-efficacy.

Using a semi-structured interview methodology, Ranta et al. (2014) asked adolescents to identify a time when they had felt very socially anxious and to then recall the thoughts that they had during the experience. Those scoring higher on the Social Phobia Inventory [SPIN; Connor et al. (2000)] recalled more negative thoughts than those scoring lower ($d = 0.48$). Although the numbers of young people with clinical levels of SAD were small, the findings were similar when the authors compared those assigned a diagnosis of clinical or subclinical social anxiety disorder ($n = 17$) compared to those with no diagnosis of SAD ($n = 116$; $d = 0.58$). Negative thoughts recalled by all participants were most commonly self-focused rather than focused on other people or the interaction. In another study comparing a sample of adolescents with social anxiety disorder with a group of healthy controls, Alfano et al. (2006) asked participants to engage in a role-play task. The authors found that not only did socially anxious youth make more negative predictions about their performance than controls ($d = 1.61$), but they also went on to believe they performed less well than they had expected,

Table 2 Studies included in review

Author	Year	*N*	Age range (y)	Mean age (SD)	Recruitment	Social anxiety measure
Alfano, Beidel and Turner	2006	48	12–16	13.6 (1.28)	Clinic sample recruited from anxiety outpatient clinic; healthy controls recruited via advert	SPAI-C
Alfano, Beidel and Turner	2008	63	Not reported	13.54 (1.21)	Clinic sample recruited from anxiety outpatient clinic; healthy controls recruited via advert	SPAI-C
Anderson and Hope	2009	392	13–17	14.50 (1.27)	Community sample recruited from school	SPAI-C
Anderson, Veed, Inderbitzen-Nolan and Hansen	2010	170	13–17	14.7 (sd not reported)	Community sample recruited from school	SAS-A, SPAI-C
Blöte, Miers, Heyne, Clark and Westenberg	2014	161	14–18	16.00 (1.38)	Community sample recruited from school	SAS-A
Erath, Flanagan and Bierman	2007	84	11–13	Not reported	Community sample recruited from school	SAS-A
Giannini and Loscalzo	2016	65	14–17	15.43 (1.00)	Community sample recruited from school	SPIN
Haller, Doherty, Duta, Kadosh, Lau and Scerif	2017	51	14–19	16.73 (1.26)	Community sample recruited from school	SAS-A
Haller, Raeder, Scerif, Kadosh and Lau	2016	95	14–17	16.67 (1.05)	Community sample recruited from school	SAS-A
Hignett and Cartwright-Hatton	2008	124	12–18	12.1 (0.25)	Community sample recruited from school	SPAI-C
Hodson, McManus, Clark and Doll	2008	171	11–14	12.24 (0.97)	Community sample recruited from school	SPAI-C
Loscalzo, Giannini and Miers	2017	90	13–17	15.30 (1.06)	Clinic sample recruited from outpatient clinic; healthy controls recruited from schools	SPIN
Miers, Blote, Bogels and Westenberg	2008	73	11–17	13.61 (36.82)	Community sample recruited from school	SAS-A
Miers, Blöte, Heyne and Westenberg	2014	331	9–17	13.34 (2.25)	Community sample recruited from school	SAS-A
Miers, Blote, Sumter, Kallen and Westenberg	2011a	127	9–17	13.02 (2.20)	Community sample recruited from school	SAS-A
Morgan and Banerjee	2006	56	11–13	12.65 (sd not reported)	Community sample recruited from school	SAS-A
Parr and Cartwright-Hatton	2009	36	13–17	14.74 (1.48)	Community sample recruited from school	SPAI-C
Pergamin-Hight, Bitton, Pine, Fox and Bar-Haim	2016	113	6–18	12.40 (3.16)	Clinic and control samples recruitment method not reported	SPAI
Rabner, Mian, Langer, Comer and Pincus	2017	60	13–18	14.9 (1.6)	Clinic sample recruited from anxiety outpatient clinic	MASC
Ranta, Tuomisto, Kaltiala-Heino, Rantanen and Marttunen	2014	135	15–16	15.9 (0.32)	Community sample recruited from school	SPIN
Rheingold, Herbert and Franklin	2003	66	12–17	15.16 (1.4)	Clinic sample recruited from anxiety outpatient clinic and advert; healthy controls recruited via advert	SPAI-C
Rudy, Davis and Matthews	2014	245	8–16	13.27 (2.14)	Community sample recruited from school	SPAI-C

Table 2 (continued)

Author	Year	N	Age range (y)	Mean age (SD)	Recruitment	Social anxiety measure
Schreiber and Steil	2013	62	14–20	16.6 (2.21)	Clinic sample recruited from anxiety outpatient clinic; healthy controls recruited via advert	SPAI
Schreiber, Höfling, Stangier, Bohn and Steil	2012	581	14–19	16.49 (1.67)	Community sample recruited from school	SPAI
Thomas, Daruwala, Goepel and De Los Reyes	2012	40	14–17	15.15 (0.97)	Clinic and control samples recruited via advert	MASC

SPAI-C Social Phobia Anxiety Inventory for Children (Beidel et al. 1995), *SAS-A* Social Anxiety Scale for Adolescents (La Greca and Lopez 1998), *SPIN* Social Phobia Inventory (Connor et al. 2000), *SAS-CR* Social Anxiety Scale for Children Revised (La Greca and Stone 1993), *SPAI* Social Phobia Anxiety Inventory (Turner et al. 1989), *MASC* Multidimensional Anxiety Scale for Children (March et al. 1997)

whereas control participants did not draw negative conclusions about their performance ($d = 1.56$). Negative self-talk was significantly more frequent in socially anxious adolescents compared to controls ($d = 0.69$) and compared to socially anxious children ($d = 0.67$).

The studies described all report consistent findings that are supportive of the cognitive model. Negative social cognitions and attitudes are elevated in adolescents endorsing more social anxiety. Two studies have suggested that this holds in clinical samples also. However, there are limitations to the data, most notably, all of the studies are correlational[1] and so the issue of whether cognitions are causally implicated in social anxiety cannot be resolved.

Negative Interpretation Bias

Social events are rarely conclusively negative, and yet socially anxious individuals will often draw very negative conclusions about their social performance and others' reactions. Considerable evidence has amassed in support of the presence of a bias amongst socially anxious adults towards interpreting ambiguous events in a negative way and appraising mildly negative events catastrophically (Mobini et al. 2013). A study by Stopa and Clark (2000) provides particularly clear evidence for this. Adults with social anxiety disorder and healthy controls were presented with ambiguous scenarios depicting social and non-social events, and with unambiguous scenarios depicting mildly negative social events. Socially anxious adults not only made more negative interpretations of ambiguous social scenarios, but they were also more likely to catastrophize unambiguous, mildly negative social events. In pre-adolescent children there are fewer studies, but a review concluded that there is reasonable evidence for the association of a negative interpretation bias with social anxiety (Halldorsson and Creswell 2017).

Turning now to adolescents, in their review, Haller et al. (2015) note that the refinement of neurocognitive abilities such as perspective-taking coupled with exposure to increasingly large and complex social networks may make some adolescents especially susceptible to drawing negative social conclusions compared to children and adults. Studies examining interpretation bias in adolescent social anxiety have used a range of methods. Four studies, with Dutch (Miers et al. 2008), Italian (Giannini and Loscalzo 2016; Loscalzo et al. 2017) and US (Rheingold et al. 2003) samples, have employed a questionnaire measure of interpretation bias. In three of the studies (Miers et al. 2008; Giannini and Loscalzo 2016; Loscalzo et al. 2017), participants were given the Adolescent Interpretation and Belief Questionnaire (Miers et al. 2008). The questionnaire presents a series of ambiguous social and non-social scenarios followed by three possible interpretations (positive, negative and neutral). Respondents are asked to rate how likely the interpretations are to pop into mind and how much they believe them.

Miers et al. (2008) found that adolescents scoring high (in the top 10%) on a measure of social anxiety (the Social Anxiety Scale for Adolescents [SAS-A; La Greca and Lopez (1998)]) made significantly more negative interpretations of social events than the average anxiety group (those scoring in the 45–55th centile on the SAS-A; $d = 1.18$) and believed these more strongly ($d = 0.54$). There were no differences in positive interpretation of social events ($d = 0.28$). High social anxiety adolescents were also more likely to make negative interpretations ($d = 0.62$) of non-social situations and to believe these negative interpretations ($d = 0.59$) more than average anxiety adolescents. In line with these findings, Giannini and Loscalzo (2016) found non-clinical high scorers (on the SPIN) endorsed more frequent negative interpretations of social situations ($d = 0.84$) and believed these more than average scorers ($d = 1.19$). However, there were some differences between the two studies. First, in this study,

[1] The term 'correlational' is used to refer to observational studies that measure co-variation either within or between groups but do not experimentally manipulate the variable.

high anxiety adolescents also made fewer positive interpretations ($d = 0.70$) than the average anxiety scorers (whereas no differences were found on this measure by Miers et al. (2008)). Second, this study did not find any differences in interpretation of non-social situations, whereas a difference had been identified in the study by Miers et al. (2008).

The study by Loscalzo et al. (2017) compared 50 adolescents with a clinical diagnosis of social phobia with non-clinical adolescents scoring high or low on the SPIN. This study also used the Adolescent Interpretation and Belief Questionnaire. In line with the findings of Miers et al. (2008) there were no group differences in positive interpretations of social situations, but the social anxiety disorder group and the high social anxiety group made more frequent negative interpretations of social situations than those in the low social anxiety group ($d = 1.82$; 1.82, respectively). Those in the social anxiety disorder group believed the negative interpretations more than those in the high ($d = 0.56$) and low ($d = 0.75$) social anxiety groups, who did not differ from each other ($d = 0.14$). In terms of content-specificity, adolescents with social anxiety disorder also made more negative interpretations of non-social ambiguous scenarios and believed these more strongly than non-clinical adolescents with high or low social anxiety. Another correlational study was undertaken by Rheingold et al. (2003). Adolescents with a diagnosis of social anxiety disorder and healthy controls completed a questionnaire measure assessing judgments of the likelihood and cost of social and non-social events. Socially anxious youth overestimated the cost ($d = 1.87$) and probability ($d = 1.50$) of negative social events and the cost of negative non-social events ($d = 0.84$) compared to controls, even after controlling for depression symptoms. However, none of these four studies assessed interpretations 'on-line' and so we cannot determine whether they are measuring direct interpretations of events as they occur or rather some pre-existing negative beliefs.

Addressing the limitations associated with this method, a recent study by Haller et al. (2016) used a novel picture-based paradigm to measure interpretation bias amongst 95 school-based non-clinical 14–17-year olds. Participants were shown an ambiguous social scene with a photograph of themselves inserted as the protagonist. They were presented with neutral, negative and positive interpretations. Social anxiety was significantly negatively correlated with positive interpretation ratings ($r = -0.48$) and significantly positively correlated with negative interpretation ratings ($r = 0.45$). Extending this finding, Haller et al. (2017) asked a community sample of adolescents to interpret ambiguous social situations presented with naturalistic photographs. Eye tracking data were gathered as a proxy measure of attentional allocation. Social anxiety levels predicted a tendency to make more negative and less positive interpretations. Furthermore, participants who spent more time on facial displays made more threatening interpretations. In a study measuring online interpretation biases in a sample of young adolescents with social anxiety disorder and a group of healthy controls (Pergamin-Hight et al. 2016) found that the clinical group made more negative interpretations compared to the control group ($d = 0.47$).

Seven studies have examined interpretation biases in social anxiety in adolescents. All point to an association between social anxiety and an increased tendency to draw negative interpretations of ambiguous social scenarios and to believe these more strongly. Findings are more mixed about the association between social anxiety and positive interpretations of social scenarios, and in relation to the interpretation of non-social events. In addition, as yet, no studies have examined whether socially anxious individuals tend to catastrophize in response to mildly negative social scenarios as would be predicted by the model.

Processing of the Self as a Social Object

Enhanced Self-Focused Attention Linked to Reduced Processing of External Social Cues

The model would predict that when a social threat is perceived, socially anxious individuals shift their attention internally and reduce processing of external social cues. Indeed, socially anxious adolescents very often talk about being painfully self-conscious in social situations. To test this hypothesis, the questionnaire-based study of Hodson et al. (2008) included the Focus of Attention Questionnaire (FAQ; Woody (1996). High socially anxious adolescents reported higher levels of self-focus compared to middle ($d = 0.49$) and low socially anxious youth ($d = 1.09$). Self-focused attention was associated with social anxiety across the whole sample ($r = 0.42$), and it was also an additional independent predictor of social anxiety, with and without simultaneous adjustment for depression scores. Consistent with this finding, Schreiber et al. (2012) also found that high socially anxious adolescents reported higher levels of self-focused attention (measured by the FAQ) compared to low scorers ($d = 1.15$). Self-focused attention was not found to be a significant independent predictor of social anxiety across the whole sample. The authors also looked at external focus of attention, measured by certain items of the Focus of Attention Questionnaire. No differences between groups were found on this subscale. The authors suggested this null finding might have resulted from the lack of specificity regarding the type of external focus captured by the items.

A more ecologically valid study was undertaken by Blöte et al. (2014). One hundred and sixty-one non-clinical 14–18-year olds gave a speech to a pre-recorded neutral audience. Questionnaire measures of social anxiety and self-focus (using the FAQ), performance expectation and audience

perception were completed. In relation to self-focused attention, it was found that as expected social anxiety was associated with higher self-focus ($r=0.43$). The relationship between social anxiety and audience perception was found to be partially mediated by negative expectations of performance and self-focused attention. In line with the findings of Schreiber et al. (2012), external focused attention was not correlated with social anxiety ($r=0.12$).

A longitudinal study was undertaken with a sample of unselected Dutch youth to examine pathways of social avoidance through adolescence and whether social anxiety and psychological processes, including self-focused attention (using the FAQ), discriminated between the pathways (Miers et al. 2014). A group of adolescents showed increasing social avoidance through adolescence, and another group showed consistently low avoidance. Self-focused attention was not found to discriminate between the two groups. However, the study was designed to identify vulnerability factors for the development of social avoidance rather than current maintenance factors.

A number of studies have been reported on that have examined the role of self-focused attention in social anxiety. In all but one study (Miers et al. 2014), self-focused attention was found to be related to social anxiety (or group differences were shown) with a medium effect. However, conclusions are limited by a number of issues. First, none of the studies were undertaken with clinical populations. Second, all of the studies used the FAQ to measure self-focused attention and often only used a small number of items taken from the questionnaire. Although the measure has been found to have moderate internal consistency, full psychometrics have not been reported with adolescents. Third, the studies cannot illuminate us on the causal role of self-focused attention in social anxiety; for this, experimental studies are needed.

Negative Observer-Perspective Social Images

The majority of adults with SAD report experiencing negative observer-perspective self-images in social situations (Hackmann et al. 2000). These are often related to events dating back to around the onset of the disorder. A number of studies have examined negative self-imagery and social anxiety in adolescents. Three of these used questionnaire or interview methods. Ranta et al. (2014) found that high socially anxious adolescents (compared to low scorers) and adolescents with SAD or subclinical SAD (compared to no diagnosis) report more negative observer-perspective self-images ($d=0.45$ and $r=0.47$, respectively). Similarly, in their study with unselected adolescents, Schreiber et al. (2012) found that high social anxiety adolescents reported more frequent negative self-images than low scorers ($d=0.81$). Frequency of negative self-images was also found to independently predict social anxiety in the group as a whole. The study used the Questionnaire of Recurrent Images in Social Phobia (QRI-SP; Schreiber et al. (2009)) which is based on the semi-structured developed by Hackmann et al. (2000) for adults to assess negative self-imagery. However, the study only used a single item of the measure and this may not be reliable with a multi-faceted construct such as self-imagery. Addressing this limitation, Schreiber and Steil (2013) administered the full QRI-SP as a semi-structured interview to 31 adolescents with a clinical diagnosis of SAD and to a matched sample of 31 healthy adolescents. They found that whilst all adolescents had experienced negative self-imagery in social situations in the past, those with SAD experienced images more frequently ($d=0.84$), and they were more distressing ($d=0.80$) and more vivid ($d=0.54$). These images were more likely to be experienced from the observer perspective by those with SAD compared to controls ($d=0.75$). Almost half of controls (45.2%) and two-thirds of the SAD group (64.5%) identified a socially traumatic event linked to the negative self-image, but this proportion did not differ between the groups. A study by Hignett and Cartwright-Hatton (2008) further examined the hypothesis that the negative images experienced by socially anxious individuals tend to be from the observer perspective. One hundred and twenty-four unselected adolescents aged 12–18 years gave a brief talk to a camera. They were then asked to bring to mind how they thought they had appeared and rate the extent to which this image was from the field or observer perspective. A modest but significant association between social anxiety (SPAI-C) and tendency to take the observer perspective ($r=0.20$) was found.

A convincing demonstration of the causal role of negative self-imagery in social anxiety in *adults* was provided by Hirsch et al. (2004) (see also Hirsch et al. (2003)). In their study, socially anxious adults took part in two conversations, holding either a negative or a benign image in mind. Findings were in line with the cognitive model: compared to a benign image, holding a negative social image in mind increased anxiety, negative appraisals and use of safety behaviours and led to a poorer judgement by the conversation partner. Alfano et al. (2008) undertook a similar experimental study with 63 SAD and healthy control adolescents. Adolescents undertook videotaped role-play and read aloud tasks. Afterwards, they rated their anxiety and their social performance and an independent assessor made objective ratings of their performance. Half the control participants were instructed to engage in negative self-imagery during the tasks and the other half received no instructions. Contrary to the hypotheses and the findings of Hirsch et al. (2004) with adults, few differences were found in observer- or self-rated anxiety or performance between the two control groups. The SAD group was consistently rated as more anxious and less socially competent. The authors conclude that

negative self-imagery may be a consequence of social anxiety rather than a causal factor as suggested by the cognitive model. However, it seems plausible that the null finding was due to design issues, in the sense that the manipulation of imagery was between-subjects which would give lower statistical power and also the control condition was not clearly defined. It is difficult to know what the imagery group was being compared to because participants in the comparison groups did not receive any instructions and were not subsequently asked about thought content during the experimental procedure. In comparison, the study of Hirsch et al. (2004) included a controlled within-subjects comparison (benign imagery). It therefore seems that there is scope for further causal experiments in adolescents including a tighter control over the experimental manipulation.

Video feedback with careful verbal preparation beforehand is a core cognitive therapy technique aimed at correcting negative and distorted self-imagery. Studies with adults have shown that the technique leads to more accurate appraisals of performance and reduced anxiety (Warnock-Parkes et al. 2017), providing corollary evidence for the role of self-images in social anxiety. Turning to studies with adolescents, Parr and Cartwright-Hatton (2009) examined the effect of video feedback with 36 highly socially anxious 14–17-year olds. Video feedback was provided with careful preparation to prepare an unbiased mode of processing (c.f. Warnock-Parkes et al. (2017)). Compared to control participants (who sat quietly), young people who received video feedback after giving a speech felt less anxious about giving a subsequent speech ($d = 1.43$), predicted that they would perform better ($d = 1.16$) and went on to rate the later speech as better ($d = 1.22$). A somewhat similar study was undertaken with 11–13-year olds, scoring high and low on the SAS-A (Morgan and Banerjee 2006). Adolescents took part in a role-play task, with half receiving video feedback and half completing a distractor task prior to rating their performance. In contrast to the findings of Parr and Cartwright-Hatton (2009), the study did not find any improvements in participants' performance ratings after video feedback for the high ($d = 0.17$) or low anxiety groups ($d = 0.16$). However, participants were not given any preparation for the video feedback. We know from adult research that whilst almost all studies have found the technique to be helpful, the two studies that have failed to find positive effects of video feedback (Rodebaugh 2004; Smits et al. 2006) did not include verbal preparation before watching the video. Careful verbal preparation is needed in order to overcome the processing biases that can undermine the effectiveness of the technique.

Reviewing the studies that have looked at self-imagery in adolescent social anxiety we find consistent results from the three questionnaire and interview studies (Ranta et al. 2014; Schreiber et al. 2012; Schreiber and Steil 2013), two of which reported on clinical samples. With a moderate effect, socially anxious youth reported more frequent negative observer-perspective social images compared to low scorers. The only experimental study to be undertaken (Alfano et al. 2008) did not find a detrimental effect of asking young people to engage in negative self-imagery, but this may be due to design issues. Looking at the relevant data on video feedback, we find that in line with adult reports, the study that undertook video feedback with careful verbal preparation yielded positive effects of the technique, whilst the study that did not include it failed to find a benefit. Experimental studies with clinical and non-clinical samples including valid manipulations are still needed to test the model's hypothesis that negative self-imagery plays a causal role in adolescent social anxiety.

Use of Internal Information

The cognitive model would predict that socially anxious individuals use internal information made accessible by self-focused attention to make excessively negative inferences about how they look to others. This hypothesis has been supported in studies with adults. For example, Mansell and Clark (1999) asked adults with high and low levels of social anxiety to undertake a speech task. Participants rated their perceived body sensations and how they thought they appeared during the task. An independent assessor also rated how they came across. Amongst adults with high, but not with low social anxiety, a significant correlation was found between perceived body sensations and how anxious they thought they looked. The correlation between assessor ratings and perceived body sensations was non-significant for both groups. The findings are consistent with the suggestion that socially anxious individuals use perceived bodily sensations to make erroneous negative judgements about how they appear.

No studies have been undertaken examining this hypothesis with adolescents. Ancillary support comes from three studies that have compared subjective and objective measures of arousal in adolescents. In a study by Anderson et al. (2010), subjective physiological arousal and heart rate during a speech task were compared between 170, 13–17-year olds with SAD, high social anxiety adolescents and controls. SAD and high social anxiety adolescents both endorsed elevated self-reported arousal (measured on a subscale of items from the on Beck Anxiety Inventory (BAI) (Beck et al. 1988) compared to controls (SAD vs. low $d = 0.71$; high social anxiety vs. low $d = 0.45$), but did not differ from one another ($d = 0.33$). There were no differences in heart rate between the groups. Comparable findings were reported in an earlier study by Anderson and Hope (2009), comparing SAD ($n = 85$) with controls ($n = 285$) during a speech and a conversation task. There was no significant difference

between groups in heart rate reactivity during the speech ($d=0.17$) or the conversation ($d=0.15$). However, adolescents with SAD rated themselves as more physiologically aroused on the BAI during both the speech ($d=0.81$) and the conversation task ($d=0.65$). In a non-clinical sample of 136, 9–17-year olds, high and low socially anxious youth were compared on self-reported and objective measures of heart rate and sweating during a speech task (Miers et al. 2011a). High social anxiety participants reported a higher heart rate and sweatier palms ($d=0.52$), but no differences in heart rate or skin conductance levels were found.

These three studies are consistent in their finding that whilst socially anxious adolescents and controls are comparable on indices of objective arousal, the socially anxious groups consistently overestimate their bodily symptoms of anxiety (Siess et al. 2014). It could be argued that these results are in line with the cognitive model because when socially anxious adolescents overestimate their physical sensations this may lead them to overestimate how anxious they *look*. However, studies in which adolescents are also asked how they think they appear are needed in order to directly test the hypothesis.

Use of Safety Behaviours

In adults, studies have found that socially anxious adults use safety behaviours in social situations more than those who are not socially anxious (e.g. Cuming et al. (2009), Pinto-Gouveia et al. (2003)). We also have robust experimental data pointing to the causal role that these safety behaviours play in social anxiety in adults (e.g. McManus et al. 2009, 2008). The data in relation to safety behaviours in children are scant (Halldorsson and Creswell 2017), but four studies have addressed the question in adolescents and they find similar results to in adults.

In the questionnaire study of Hodson et al. (2008), adolescents completed a self-report measure of safety behaviour use, the Safety Behaviour Questionnaire (Clark 2003). High social anxiety adolescents endorsed a greater use of safety behaviours compared to middle ($d=0.65$) and low ($d=1.01$) scorers, who did not differ from each other ($d=0.32$). Safety behaviour use was significantly associated with social anxiety across the whole sample ($d=0.94$), but it did not emerge as a unique predictor of social anxiety. In line with this study, Schreiber et al. (2012) using the same measure of safety behaviours (translated into German) found that high socially anxious 14–20-year olds used safety behaviours more than low socially anxious youth ($d=1.34$). In contrast to the study of Hodson et al. (2008), they did find that across the whole sample safety behaviour use was a significant independent predictor of social anxiety but not of depression. Ranta et al. (2014) asked unselected adolescents about the safety behaviours they had used when they had felt socially anxious. 17% of the whole sample reported using at least one safety behaviour when they felt socially anxious. Safety behaviours were more frequent in the high social anxiety group compared to the low group ($d=0.68$), and amongst those with a clinical or subclinical diagnosis of SAD compared to without ($r=0.63$). The fourth study was undertaken by Thomas et al. (2012). The authors administered a measure of safety behaviours developed with adults, the SAFE (Cuming et al. 2009), and a measure of social anxiety to a group of adolescents referred to a clinic with possible social anxiety and to a group of community controls. In line with hypotheses, social anxiety was positively correlated with safety behaviour use across the whole sample ($r=0.49$), and the socially anxious group endorsed significantly greater safety behaviour use than the community controls ($d=0.77$).

In summary, four studies have looked at safety behaviours in adolescent social anxiety. A medium to large effect was found. Unfortunately, all of the studies were correlational. Studies modulating the use of safety behaviours and examining the effect (on, for example, anxiety, cognitions, self-focus and social performance) will be important in order to test the hypothesis that these behaviours are causally implicated in social anxiety. Due to the sensitised peer environment during adolescence we would expect avoidance safety behaviours to result in particularly negative reactions from their peers, and so socially anxious adolescents will be susceptible to becoming locked into a vicious cycle and subjected to peer victimisation, which we know is especially common in adolescents (Troop-Gordon 2017). Experimental studies will be valuable here. Furthermore, there are as yet no studies examining the putative sub-types of safety behaviours, their effects amongst adolescents or developmental influences on the use of safety behaviours. For example, it is conceivable that there may be a developmental progression in young people's use of safety behaviours. As children move into and through adolescence they may become increasingly sophisticated in their use of safety behaviours, for example moving from a reliance on avoidance behaviours towards increasing adoption of impression management behaviours.

The notion of safety behaviours provides a different perspective on the understanding of the inhibited or withdrawn behaviours of people who are socially anxious. Traditionally, these behaviours have been interpreted as a sign that the individual lacks social skills (Wong and Rapee 2015). However, treated adults do not show ongoing social skills deficits (for a review see Hofmann (2007)). When individuals are not anxious they do not show deficits in social skills. Any deficits in performance seem to be largely restricted to situations in which they are anxious, which suggests that they are an anxiety response rather than an indication of a lack of knowledge or ability (Alden and Taylor 2004). It seems likely that the apparent social skills deficits are in fact the

observable safety behaviours (and the avoidance behaviours in particular).

Turning to studies with young people, in pre-adolescents a recent review concluded that there is evidence for an association between social anxiety disorder and a skills deficit (Halldorsson and Creswell 2017). In adolescents, a number of studies have found that peers rate socially anxious youth as less socially skilled than non-anxious peers (e.g. Miers et al. 2011b, 2010). However, as highlighted by Wong and Rapee (2015), it is not possible to determine the direction of causality from these studies. Further, none of these studies have considered the contaminating effect of safety behaviours on social skills. As such, it is difficult to draw conclusions from the available studies about whether there is a latent skills deficit. It will be important to test whether in adolescents, as in adults, the apparent performance deficits can in fact be explained by observable safety behaviours. Indeed, it seems plausible that if, as we suggest, socially anxious younger people do rely on avoidance safety behaviours more than impression management strategies, they may present as even more withdrawn and inhibited than socially anxious adults. As such, a performance deficit account could be drawn upon more readily with this population, despite the absence of an extant deficit. It will be important to test this hypothesis, as it has implications for our understanding of the maintenance of social anxiety and for treatment.

Pre- and Post-event Processing

Pre-event Processing

Worry is a feature of all anxiety disorders, and the cognitive model predicts that it is an important maintenance process in social anxiety as well. Examining this hypothesis, the questionnaire studies of Hodson et al. (2008) and Schreiber et al. (2012) both used a single item from the Social Phobia Weekly Summary Scale (Clark 2003) to measure pre-event processing ("over the past week, how often have you gone over in your mind things that you think might go wrong in a social situation before entering the situation"). In the study by Hodson et al. (2008), high socially anxious youth engaged in worry before social situations more than middle ($d=0.86$) and low ($d=0.86$) social anxiety groups, who did not differ from each other ($d=0.18$). Across the whole sample, pre-event processing was significantly associated with social anxiety ($r=0.44$) but also to depression ($r=0.42$). It was a significant independent predictor of depression but not of social anxiety. This suggests that the process may not be specific to social anxiety, which is unsurprising given that repetitive thinking processes are implicated in a range of common mental health disorders (Watkins 2008). Schreiber et al. (2012) also found that high socially anxious youth reported more anticipatory worry than low scorers ($d=0.84$). Again consistent with the findings of Hodson et al. (2008), pre-event processing was found to be an independent predictor of depression but not social anxiety in regression analyses. A correlational study of 60 adolescents with an anxiety disorder diagnosis (Rabner et al. 2017) found a significant correlation between self-reported social anxiety symptoms and worry ($r=0.432$), as measured by the Penn State Worry Questionnaire (Chorpita et al. 1997).

Studies examining the related idea of anticipated performance criticism are relevant here. A recent study of anticipated audience criticism (Ranta et al. 2014) tested the hypothesis that socially anxious adolescents tend to expect more negative audience reactions in non-threatening situations compared to their peers. Amongst 333 adolescents scoring in the top and bottom quartile of the SAS-A, their hypothesis was confirmed: socially anxious youth demonstrated a tendency to expect negative classmate reactions (measured by self-report questionnaire) when they were the presenter ($r=0.60$). There were no differences in expectations between anxiety groups when participants were asked to imagine an anxious peer rather than themselves, or in positive expectations of reactions. Similarly, in a study by Blöte et al. (2014), social anxiety was associated with more negative expectations of performance before a speech task ($r=0.32$). Likewise, asked to rate expectations of their performance in a videotaped role-play task, high socially anxious young adolescents thought they would perform worse than low scorers ($d=0.51$; Morgan and Banerjee (2006)). Erath et al. (2007) asked 42 high socially anxious and 42 average anxiety adolescents to undertake a videotaped conversation task with a young adult. Higher social anxiety was significantly correlated with expectations of poorer social performance ($r=0.27$). In addition, negative social performance expectations predicted skill deficits in the conversation task ($r=0.25$).

These findings are all consistent with the cognitive model; pre-event processing involves a focus on potential negative outcomes of a social situation and an anticipation of social failure. These negative expectations will increase the likelihood that the situation is interpreted negatively, ones focus of attention shifts internally and safety behaviours are utilised, thereby maintaining anxiety. However, although using a variety of methods, all of these were correlational studies with analogue samples.

Post-event Processing

Rumination is in many respects a similar process to worry, and like worry it is implicated in a wide range of mental health difficulties (Watkins 2008) including social anxiety. Only two studies have examined this process in adolescent social anxiety. Using comparable methodologies, both Hodson et al. (2008) and Schreiber et al. (2012)

examined whether group differences in post-event processing could be identified amongst a stratified non-clinical sample. Both used the Post-Event Processing Questionnaire (Rachman et al. 2000). It comprises 13 items related to how much the individual went over an event afterwards. Hodson et al. (2008) found that high socially anxious youth reported more post-event processing than middle ($d=0.62$) or low ($d=0.95$) groups (who did not differ from each other ($d=0.30$). Post-event processing was significantly associated with social anxiety across the whole sample ($r=0.40$) and with depression ($r=0.28$). It was also a significant independent predictor of social anxiety. In the study of Schreiber et al. (2012), high socially anxious youth endorsed more post-event processing than low scorers ($d=0.94$). In regression analysis, post-event processing was not a significant independent predictor of social anxiety, but it was of depression.

In summary, only two studies have looked at the role of post-event processing in adolescent social anxiety. Whilst both indicate that the process is elevated in adolescents with higher levels of social anxiety (with a medium effect), they were questionnaire studies with analogue samples, limiting the conclusions that we can draw.

Summary

Reviewing the studies undertaken with adolescent samples we see that there is encouraging support for the hypotheses derived from the cognitive model of Clark and Wells (1995). However, as yet the majority of studies have been undertaken with analogue samples, typically comparing extreme scorers on a measure of social anxiety. This is generally considered to be a valid research strategy given that social anxiety is thought to vary continuously across the population (Stopa and Clark 2001), but it will be important to replicate the findings with adolescent clinical samples. Another limitation of the studies is that the majority of them have been correlational. As such the resultant findings provide promising support for the hypotheses but cannot demonstrate the causal status of the processes in the model. To address this gap in the literature, further experimental studies are needed in which the psychological processes of interest are manipulated and their effect on social anxiety observed. As well as this, when considering the downward application of a static adult model to a dynamic adolescent period, there is a need to consider the developmental influences that have a bearing on these processes. Notwithstanding these caveats, the literature is sufficiently encouraging to suggest that adapting the treatment derived from the model for adolescents might be a promising approach. When considering this, attention must turn to the additional developmentally sensitive elements that may need to be included to explain the maintenance of social anxiety during the teenage years. There are features that are particular to adolescence that may well lock young people into the negative cycles that maintain social anxiety.

Developmentally Sensitive Factors Relevant to the Application of the Model to Adolescents

As outlined earlier, adolescence is a developmental period associated with particular cognitive, social and familial changes and these may well contribute to the persistence of social anxiety. We will focus here on the two factors that seem most salient and have been subject to the most scientific interest: parental factors and friendships and peer victimisation. Our ambition here is not to undertake a comprehensive review of these factors, but rather to consider whether these factors are associated with social anxiety, and if so, how they may maintain key processes in the cognitive model. We also briefly touch on the relationship between social anxiety and social media use. Although the research field is still relatively small it is an area of particular relevance in relation to adolescents and social anxiety.

Parenting Factors

Family processes, and parenting processes in particular, are commonly agreed to be a contributory factor in the development and maintenance of child anxiety (Rapee et al. 2009). The vast majority of the research in this area has been conducted with pre-adolescent children (Kendall and Ollendick 2004). However, given that the demands of parenting will shift and change considerably as children move into adolescence, it seems reasonable to think that parental influences on youth anxiety may also change during this time. For example, with increasing independence and autonomy the association between parental factors and child anxiety may be hypothesised to decrease over time. But it is equally conceivable that given the potential importance of parents in helping young people navigate their increasing autonomy, parental factors may be relevant in adolescent anxiety.

The most well-researched dimension of parenting in the aetiology and maintenance of youth anxiety is parental over-control or overprotection. This is defined as a pattern of behaviour involving overly protective, directive and controlling behaviours, even when the situation does not require it, and discouragement of independent problem solving. A recent review concluded that the majority of available studies (75%) point to a significant contribution of parental over-control to adolescent anxiety in general (Waite et al. 2014)

and there is some evidence of its association with social anxiety symptoms specifically in pre-adolescents (Halldorsson and Creswell 2017).

In adolescents, three studies are particularly relevant when examining the relationship between parenting and adolescent social anxiety specifically (Loukas 2009; Fisak and Mann 2010; Caster et al. 1999). All were questionnaire studies undertaken with analogue adolescent samples in the USA. Adolescents completed measures assessing social anxiety (the SAS-A) and perceptions of parenting. The study by Loukas (2009) looked at the relationship between social anxiety and the perception of maternal psychological control amongst 479, 10–14-year olds. No significant association was found ($r = 0.02$ for females, and $r = 0.10$ for males). The study by Fisak and Mann (2010) focused on 348 older adolescents (aged 15–18 years). Participants were split into 'High' (> 50 on the SAS-A) and 'Low' social anxiety groups. The high anxiety group rated their parents as more likely to model social fears, discomfort and avoidance ($d = 0.39$) and to communicate shame and criticism of adolescent's social interactions and skills ($d = 0.47$). Adolescent perceived parental sociability and tendency to engage in social situations outside the family did not differ between groups ($d = 0.08$). Caster et al. (1999) undertook a large study comparing perceptions of parenting and the family environment made by adolescents categorised as high or low socially anxious. Adolescents were categorised in the high group if they scored at least one standard deviation above their gender and grade average on one or more of a number of measures of social anxiety (including the SAS-A). Those scoring at or below their gender and grade mean were classified as low social anxiety. High socially anxious youth rated all dimensions of the Family Environment Questionnaire (Caster et al. 1999) higher than low socially anxious youth. Specifically, they perceived their fathers and mothers as being more socially isolating, as being more concerned about others' opinions, more ashamed of their shyness and poor performance, and less socially active (all d's between 0.37 and 0.69). A particularly interesting aspect of this study was the inclusion of parental reports of the family environment (using the same Family Environment Questionnaire). No significant differences in parent ratings of the family environment were found between parents of high and low socially anxious youths.

Overall, two of the three studies have found significant group differences between non-clinical groups scoring high and low on a measure of social anxiety. Interestingly, in one study this did not tally with findings on parent ratings of the family environment. All the studies used measures of perceptions of parenting. This makes sense in many ways, but if anxious adolescents are negatively biased in how they process information then higher scores on negative parenting dimensions may reflect a more general negative bias rather than a specific appraisal of parenting quality. Studies including measures of parenting completed by socially anxious youth and their parents as well as observational assessment of parenting would greatly add to the field. There has also been a notable lack of experimental studies examining the effect of manipulating parent–child interactions. One exception was an elegant study carried out by de Wilde and Rapee (2008) (although with pre-adolescents (mean age 10.19y), hence not reported in detail here). In brief, mothers were either required to be minimally or overly controlling with their children during preparation for a speech task. In a subsequent speech that the children prepared for alone, those whose mothers were overly controlling reported more anxiety than those whose mothers had been minimally controlling. Studies such as this would be especially informative about the relevance of parenting processes in adolescent social anxiety.

We can now consider the ways in which aspects of parenting may relate to the processes specified in the cognitive model. It seems likely that the relationship between parent and child anxiety, beliefs and behaviour is iterative and interactive (Rubin et al. 2009). Parents will bring their own attitudes and assumptions to their parenting practices. These parental beliefs are likely to motivate particular parenting behaviours (Rubin et al. 2009). Parenting beliefs characterised by a heightened perception of threat in the social environment and/or appraisals relating to their child's vulnerability will most likely lead to anxiety about a child's ability to thrive in a social environment. As such parents may engage in overprotective or over-controlling behaviours to mitigate their concerns (Rubin et al. 1999). Whilst well intentioned, we would suggest that these behaviours perpetuate the young person's perception of social threat. The behaviours will be a source of evidence to the young person that they are less socially able than their peers and thereby maintain their negative attitudes (Ollendick and Hirshfeld-Becker 2002). Parental behaviours will become proxy safety behaviours for the young person. For example, a parent with these beliefs may step in and speak for their child, or give them permission to avoid social situations. These actions will preclude the young person's opportunities to learn that their fears were unfounded or exaggerated. Some parents become constant companions to their teenage children. This could discourage the child's peers from approaching or engaging with them, and so directly maintain social isolation.

Whilst some parents may hold overprotective beliefs, other parents may take quite a different view of the social environment and their child. Some parents' beliefs may emphasise the importance of performing and being heard in a social situation. These may be driven by a parent's temperamental extraversion or by a socially anxious parent who has coped by relying on impression management safety behaviours. Parents with these views may perceive their child to

be missing out on opportunities and as such may express disappointment when their child feels unable to take part in a social commitment (Knappe et al. 2010; Bruch 1989). Likewise, they may push their child to engage in excessively demanding social activities in an attempt to help them overcome their fears. Again, we would suggest that whilst these behaviours are undoubtedly driven by good intentions they will maintain the young person's anxiety. The young person will interpret expressed disappointment or frustration as evidence of their social failings. When faced with an excessively challenging social scenario, rather than learning new lessons the young person will most likely worry intensely beforehand, rely heavily on safety behaviours to get through the experience, and then ruminate over it afterwards, thereby preserving the negative thinking patterns.

These proposals provide a number of testable hypotheses that have not yet been examined. If supported, the account opens up the potential utility of including specific, focused work with parents in certain cases, where unhelpful parental beliefs and behaviours have been identified and where the young person is not progressing in treatment as one would expect and hope. Several well-established cognitive therapy techniques would be well suited to address parental beliefs and behaviours. For example, parents could be helped to identify unhelpful beliefs they hold and the impact of these on their child's social anxiety. This could set the stage for behavioural experiments to test out specific predictions. The involvement of the adolescent in these experiments is likely to increase their effectiveness.

Friendships and Peer Victimisation

As children progress into adolescence, their social relationships become increasingly important (Furman and Buhrmester 1992). They will begin to see their peers as their primary source of social support (Nickerson and Nagle 2005), and so peer relationships take on even greater significance. Adolescents start to manage their own social arrangements, and their relationships will become more complex through this period, with different groups, cliques and subgroups forming, and with the start of romantic relationships. It is unsurprising that good peer relationships are associated with broad indices of well-being in adolescents (Chu et al. 2010). Alden and Taylor (2004) emphasised the importance of interpersonal processes in social anxiety and suggested that social anxiety is maintained by self-perpetuating relationship difficulties.

Numerous studies have examined the relationship between various dimensions of peer relationships and social anxiety cross sectionally. Consistently, less positive peer experiences have been found amongst socially anxious adolescents compared to their less anxious peers, in terms of fewer friends, less peer acceptance, more victimisation and less numerous and happy romantic relationship (see Rubin et al. (2009) for a review). A number of longitudinal studies have considered the impact of social anxiety on later peer relations (e.g. Siegel et al. (2009); Vernberg et al. (1992)). For example, in a two month prospective study examining peer victimisation and social anxiety, Siegel et al. (2009) found that social anxiety predicted relational victimisation, a particular type of peer victimisation. Relational victimisation describes behaviours that use the relationship to in some way harm the intended victim, for example, not inviting a peer to a party, or not allowing another peer to join a group. Turning now to the reciprocal relationship, studies have also examined whether peer processes predict later social anxiety. In line with expectations, more negative peer relations have consistently emerged as a predictor of later social anxiety. For example, in a large sample of 12–19-year olds, lower levels of peer acceptance (as rated by peers) were associated with social anxiety levels one year later (Tillfors et al. 2012). A number of studies have found a relationship between peer victimisation and later social anxiety (Siegel et al. 2009; Storch et al. 2005; Vernberg et al. 1992). Interestingly, two studies (Siegel et al. 2009; Storch et al. 2005) again point to the significance of relational victimisation in social anxiety.

The convergent findings of a reciprocal relationship between social anxiety and peer difficulties are in line with the proposals of Alden and Taylor (2004) that social anxiety may lock individuals into a vicious cycle of interpersonal difficulties. It seems likely that these problems may be heightened during adolescence, when the socially anxious adolescent's peers are themselves likely to be self-consciousness and particularly sensitive to potential rejection. This leads us to consider how peer problems may be related to the processes specified in the cognitive model. There are a number of ways this might operate, and the following mechanisms are suggested. When an individual experiences peer difficulties this may inform beliefs about their social acceptability directly and drive social anxiety. This suggestion is supported by findings from Grills and Ollendick (2002) in their study of 279 early adolescents. Amongst girls, perception of global self-worth was found to mediate the relationship between anxiety and peer victimisation. Social anxiety will inevitably cause some peer difficulties because gross avoidance of social interactions will limit individuals' opportunities to forge friendships. It is also suggested that the socially anxious adolescent may be more vulnerable to unfriendly or victimising treatment due to their appraisals of others and the negative beliefs they hold. For example, the tendency for socially anxious adolescents to make negative interpretations of ambiguous social cues may lead them to respond to a fairly neutral situation in an excessively meek, unfriendly or avoidant manner. This may in turn lead to genuinely negative responses from peers. The use of avoidant safety behaviours will contaminate a social interaction;

for example, avoiding eye contact and speaking less will convey disinterest. This will make an individual less attractive to their peers, reducing peer acceptance and thereby strengthening negative social beliefs. Furthermore, specific safety behaviours such as agreeing with other people and copying the dress sense of others in order to 'blend in' may lead to particular negative responses from peers in adolescence. This is because although adolescence is a time of low resistance to peer influence (Steinberg and Monahan 2007), it is also when individuals are concerned with determining their own identity and they are typically acutely sensitive to being copied.

Delineating these mechanisms provides a wealth of treatment opportunities. For example, the problematic negative thinking patterns and safety behaviours that may be implicated could be targeted well with existing cognitive therapy techniques. However, particular caution may be needed when planning behavioural experiments with teenagers in order to ensure positive outcomes. The 'pack mentality' of the social environment, increased frequency of peer victimisation, and heightened sensitivity to peer reactions in this period can all complicate behavioural experiments. Experiments should be set up in social contexts that are likely to lead to positive learning experiences for the adolescent patient. It may be necessary to undertake experiments in analogue social settings prior to testing out fears with known peers.

Social Media Use

Almost all young people now have access to a smartphone or to a tablet, laptop or desktop computer (Lenhart 2015). Over 90% go online daily, and almost a quarter use the Internet 'almost constantly' (Lenhart 2015). Whilst many adolescents spend time playing video games when online, almost all engage with social media. The number of social networking sites has grown in the last few years with the launch of influential sites such as Snapchat and Instagram. Social media is now one of the main ways that young people communicate with one another (Gross 2004), with modes of communication such as email, telephone and SMS falling in popularity. This is in contrast to adults. Although as a group the number of adults using social media has grown over the last few years, age remains negatively correlated with use (Duggan et al. 2015). For this reason, the relationship between social media use and social anxiety is of particularly relevance to adolescents. Because there are relatively few studies that have looked at social media use and social anxiety in adolescents, we have considered studies with both adolescents and young adult samples. Therefore, studies comprising adolescent samples are labelled as such and for those with adult samples we have included details of the age of the sample.

Online communication will hold great appeal for individuals with social anxiety (Pierce 2009). It provides the much-desired opportunity to interact with other people in a less anxiety-provoking setting than a face-to-face interaction (Bonetti et al. 2010; *adolescent sample*). In line with this, a number of studies indicate a positive relationship between social anxiety and time spent on social networking sites (e.g. Lee-Won et al. (2015), mean age = 19.69 years, SD = 1.12 years; Shaw et al. (2015), mean age = 19.2 years, SD = 1.27 years; Orr et al. (2009), mean age = 21.5 years, SD = 5.29 years). One of the reasons online communication may be perceived as less threatening is because individuals feel they are more able to control the information they share and how they present themselves (Caplan 2007; mean age = 19.4 years, SD = 1.37 years). Indeed in a correlational study, adolescents with greater social anxiety reported valuing the controllability of online communication (Peter and Valkenburg 2006; *adolescent sample*). It might be that this is because online, socially anxious individuals are able to engage in safety behaviours more intensively (Harman et al. (2005), *adolescent sample*; Campbell et al. (2006), mean age = 28.7, SD = 10.16 years). For example, they can repeatedly edit posts and spend time preparing responses to messages.

Social anxiety will influence the ways in which people use social media. For example, social anxiety is associated with more passive use of social networking sites such as Facebook (Shaw et al. 2015). Rather than interacting with other users or posting material, people with social anxiety spend more time browsing other peoples' profiles (Seabrook et al. 2016, *lifespan review, authors note that 'the majority of studies examined young adults (late teens or early 20s)'*). This type of use will lead individuals to generate unfavourable social comparisons (Vogel et al. 2015) thereby confirming negative social beliefs. Whilst we know that social comparison also occurs offline (Buunk and Gibbons 2007; *review paper*), the online environment may be particular problematic because such a wealth of information is available (for example on profile pages, and through images and videos) and there are fewer limits on how long someone can spend browsing (Vogel et al. 2015; mean age = 18.93 years, SD = 3.94 years). We would also expect social anxiety to influence the ways that socially anxious individuals actively use these sites. For example, it is suggested that when socially anxious individuals do post material, this may tend to be self-denigratory in content; it may be that they would prefer to 'get the criticism in first' before they can be maligned by others.

Social media also provides another forum for peer victimisation. 'Traditional' bullying may continue after school and extend into online behaviours (Juvonen and Gross 2008; *adolescent sample*). Due to the anonymity that the Internet affords, there may be fewer barriers to perpetrating

bullying online and it may be harder to stop (Slonje et al. 2013; *adolescent sample*). A survey of secondary school children found that the most common form of cyber bulling is name-calling via instant messaging (Smith et al. 2008; *adolescent sample*). Cyber bullying is associated with negative outcomes including social anxiety. Cross-sectional studies have found a significant association between social anxiety and cyber bullying (Dempsey et al. 2009, *adolescent sample*; Kowalski and Limber 2013, *adolescent sample*). Two longitudinal studies indicate that social anxiety may confer vulnerability to online victimisation (Juvonen and Gross 2008; van den Eijnden et al. 2014, *adolescent sample*).

When thinking about treatment, we suggest that online social interactions need to be understood and addressed alongside those that occur face-to-face. This would start with a careful assessment of online behaviour at the beginning of treatment. Online safety behaviours could be targeted well with existing cognitive therapy techniques.

Treatment Implications and Emerging Evidence

Cognitive therapy for social anxiety disorder in adults is comprised of a series of techniques designed to reverse the processes specified in the Clark and Wells cognitive model (1995). The techniques are listed in Table 1. Broadly, the treatment adopts an approach which encourages the patient to discover for him or herself how their social anxiety is maintained. This is achieved through a focus on experiential exercises; for example, a behavioural experiment is undertaken early on in therapy to demonstrate the unhelpful effects of self-focused attention and safety behaviours. Similarly, patients learn to focus their attention externally through a series of practical exercises. We would suggest that this method, of fostering cognitive change through action, is particularly well suited to adolescents, and we expect that many of the core elements of treatment could be employed successfully with adolescents with modest adaptations.

Only two randomised controlled trials have been undertaken examining the effectiveness of therapeutic interventions based on the cognitive model of Clark and Wells (1995) with children and young people. One of these involved children (Melfsen et al. 2011), but we describe it briefly here for interest. Forty-four socially anxious young people aged between 8 and 14 years of age were randomly allocated to individual therapy based on the cognitive model or to a waitlist control group. The authors reported medium to large effects of individual therapy compared to waitlist control on clinician reported (German version of the Anxiety Disorders Interview Schedule; $d=0.96$) and self-reported outcomes (German version of the SPAI; $d=0.91$). The results are certainly encouraging. However, the treatment did not represent a full implementation of cognitive therapy. For example, five to six sessions were dedicated to psycho-education. In cognitive therapy we would usually spend no longer than 15 min on this in session one. Critical components, such as the safety behaviour and self-focused attention behavioural experiment that is undertaken in session two of cognitive therapy, were not included. In addition, the trial was with children not adolescents.

Ingul et al. (2014) undertook a randomised controlled trial with socially anxious adolescents in which individual therapy based on the cognitive model was compared to the adolescent group version of Coping Cat (The CAT Project) and an attention placebo. The attention placebo involved group meetings in which socially anxious young people interacted with peers and adults to a similar degree to the treatment arms, but did not receive any of the hypothesised active components of the two treatments. A large effect of individual therapy was found on the SPAI post-treatment ($d=2.96$). Surprisingly, there was no effect of Group CAT on self-reported SPAI ($d=-0.10$) and a small effect of attention placebo ($d=0.50$). The benefits of individual therapy were maintained at follow-up. The results are promising with regards individual therapy; however, treatment was not wholly consistent with cognitive therapy. For example, the first three sessions comprised psycho-education about anxiety, drawing up a broad model of anxiety maintenance, developing an anxiety thermometer and hierarchy, and learning about negative thoughts and thinking errors. An individualised version of the cognitive model was not introduced until session four (compared to session one in cognitive therapy).

In response to these promising findings, we undertook a treatment development case series to test preliminary feasibility of cognitive therapy with adolescents (Leigh and Clark 2016). Cognitive therapy was delivered to five adolescents, all of whom had severe and chronic social anxiety disorder as well as comorbid difficulties at the start of treatment. Four of the five had already received a standard course of CBT without apparent response. By the end of treatment, symptoms of social anxiety, as well as associated anxiety and depression, had reduced to subclinical levels and these gains were maintained at three to six month follow-up. All the young people also showed improved functioning, as evidenced by increased social participation and 100% school attendance at follow-up. Excitingly, we had the first indication that social anxiety treatment may also have a positive impact on classroom concentration, as evidenced by the self-reported improvement across all five patients. The average change (79%) on the primary outcome measure (the Liebowitz Social Anxiety Scale; Liebowitz (1987)) was greater than observed in our trials of cognitive therapy for social anxiety disorder in adults (57 and 63% in Clark et al. 2003, 2006).

Whilst the evidence base is extremely small, the results converge to suggest cognitive therapy may have important promise for adolescents with social anxiety disorder. Notably, although the trial of Ingul et al. (2014) did not test the full treatment, it demonstrated specific treatment effects.

Conclusions and Future Directions

The present review was motivated by an awareness of the divide in our understanding of the maintenance of social anxiety in adults compared to in adolescents. For example, in adults the development of empirically supported theoretical models to explain the persistence of social anxiety has paved the way for the generation of highly effective NICE recommended cognitive behavioural therapies (see Clark (2013) for a review). In contrast, a detailed mechanistic approach to understanding the maintenance (as opposed to the aetiology) of adolescent social anxiety has largely been lacking. This lack of maintenance models has limited the development of specific treatment techniques for adolescents. In response to this, the present review has focused on one particular model of social anxiety, the cognitive model of Clark and Wells (1995) and its application to social anxiety in adolescents. The review highlights the need for a programme of experimental studies with adolescents in order to test the causal role of the processes specified in the model. Notwithstanding this gap in the literature, the studies reviewed provide very promising support for the application of the model to this age group.

When adopting an adult model such as this for a youth population, it is of course essential to take a developmental perspective. It is suggested that there will be developmental influences on the psychological processes specified in the adult model. For example, as individuals progress through adolescence we would expect that they may use different safety behaviours (younger adolescents may rely on parents to speak for them but this may become developmentally inappropriate for older adolescents) and that the safety behaviours they tend to rely on may change over time (such as an increasing use of more sophisticated impression management safety behaviours with age). Turning to mental imagery, given that the ability to generate, inspect, maintain and manipulate mental images develops in an extended fashion through childhood and adolescence (Burnett Heyes et al. 2013), socially anxious adolescents may be particularly vulnerable to distressing social imagery, finding it difficult to inhibit images or shift attention away from them when they occur. But given this susceptibility, adolescents may also be particularly responsive to interventions targeting negative imagery. Likewise, given that adolescence is associated with heightened self-consciousness, socially anxious adolescents may show especially intense self-focus in social interactions, but they may also be especially responsive to an attention training intervention. No studies have yet examined these questions. As well as considering the developmental influences of the processes specified in the adult model, the explanatory power of the model will be enhanced with the addition of processes that are particular to adolescents, such as parental and peer processes. When considering these factors, it will be important to specify the mechanisms by which they maintain social anxiety in order to develop specific interventions.

The present review underscores the great potential for adapting and refining the cognitive model of social anxiety disorder (Clark and Wells 1995) for adolescents in order to improve treatment outcomes for this population.

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Compliance with Ethical Standards

Conflict of Interest David M. Clark is a co-author of the Clark and Wells (1995) Cognitive Model of Social Anxiety Disorder.

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PLOS ONE

RESEARCH ARTICLE

The effects of modifying mental imagery in adolescent social anxiety

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Abstract

Background

The identification of negative self-imagery as a maintenance factor in adult social anxiety has led to enhanced treatments for this population. Whilst intrusive negative imagery is commonly reported by socially anxious adolescents, no studies have demonstrated that it plays a causal role in maintaining symptoms. To assess this possibility, we undertook an experimental study manipulating social self-imagery in high socially anxious adolescents.

Methods

High socially anxious adolescents undertook two conversations under different conditions. During one conversation they held a negative social self-image in mind, and in the other they held a benign social self-image in mind. Self-report, conversation partner report and independent assessor ratings were taken.

Results

When participants held a negative self-image in mind, they reported feeling more anxious, and believed they looked more anxious and performed more poorly. Furthermore, they overestimated how anxious they looked compared to conversation partner ratings. As well as distorting participants' perception of their anxious appearance, holding a negative image in mind also had observable effects on the interaction. Participants were rated as looking more anxious and performing less well by their conversation partner when they held such images in mind, and the conversation was rated more critically by conversation partners and independent observers. Finally, a preliminary mediation analysis suggested that the detrimental effect of negative imagery on the social interaction may be partly due to the spontaneous use of avoidant safety behaviours.

Conclusions

The findings provide support for a causal role of negative self-imagery in adolescent social anxiety and point to the potential clinical value of techniques targeting imagery to treat the disorder.

Competing interests: The authors have declared that no competing interests exist.

Abbreviations: SA, Social Anxiety; SAD, Social Anxiety Disorder; VAS, Visual Analogue Scales.

Introduction

The majority of adults with social anxiety disorder (SAD) report experiencing intrusive negative and distorted images of themselves in social situations [1]. The images are usually closely linked to the individual's particular fears, for example, a patient with a fear of shaking may notice a slight tremble in her hand which would trigger a distorted image of her hand shaking violently. Spontaneously occurring images are experienced from an observer's perspective [1], and so it is understandable that patients assume the images are accurate. Clark and Wells [2] suggested that these excessively negative images are causally implicated in the maintenance of social anxiety. Specifically, the experience of negative images increases anxiety and motivates the use of unhelpful safety behaviours. Safety behaviours are intended to prevent or minimise a feared outcome from occurring, and may involve avoidance (e.g. avoiding eye contact, speaking less), or management of the impression one conveys (e.g. preparing topics of conversation in advance, monitoring) [3]. It has been suggested that avoidance safety behaviours may be especially unhelpful as they convey a disinterested or unfriendly impression, thereby 'contaminating' the social interaction.

Experimental studies that have directly manipulated self-imagery in socially anxious adults are consistent with the assertion that negative images maintain social anxiety in adults. For example, in a pair of studies, Hirsch et al. [4, 5] experimentally manipulated imagery amongst high socially anxious adults during a conversation task. They found that holding a negative (compared to a neutral) image in mind made participants feel more anxious, believe that they performed less well, increased the spontaneous use of safety behaviours, and led to more negative appraisals by others. Furthermore, an association was found between the use of avoidant safety behaviours and more critical ratings by the conversation partner, but not with impression management safety behaviours, consistent with the notion that avoidant safety behaviours are particularly detrimental. These findings have paved the way for the development of specific therapeutic techniques aimed at correcting distorted self-imagery, most notably video feedback [6].

The question of whether intrusive negative self-imagery is also relevant to adolescent social anxiety has been addressed only partially up to now. It would seem to be a pertinent question given the increase in social worries [7] and social anxiety disorder [8] during the adolescent period. Furthermore, it is possible that intrusive negative images are more problematic in adolescence, when individuals are less able to attain cognitive control over mental imagery [9]. Three observational studies have reported on the relationship between social anxiety and negative self-imagery in adolescents and a medium association was reported [10–12], for a review see Leigh and Clark [13]. However, all three studies were correlational and cross-sectional and so cannot answer the question of whether negative self-imagery plays a causal role in maintaining adolescent social anxiety. Experimental studies, in which a process of interest is manipulated and the effects measured, provide a powerful method of testing causation. The only experimental study that has manipulated self-imagery in adolescents was undertaken by Alfano and colleagues [14]. Adolescents with SAD and healthy controls took part in videotaped role-play and read-aloud tasks and then rated their anxiety and performance. An independent assessor also rated their performance. Half of the control participants were instructed to engage in negative self-imagery during the tasks. The other half of the control group and the SAD group received no instructions for the tasks. The SAD group was rated as more anxious and less competent, whilst minimal differences were found between the control groups. Whilst this could be because negative self-imagery is a consequence rather than a cause of social anxiety, design issues could also explain the findings. In particular, for the control group with low symptoms of social anxiety, the experience of negative self-imagery in social settings will be

relatively rare, and so it is likely that they would have found it difficult to generate and maintain negative self-images. In our study we addressed this issue by selecting a group of adolescents with high social anxiety, then experimentally manipulating spontaneously occurring self-imagery. This provides a more robust test of the hypothesis that negative self-imagery is causally implicated in adolescent social anxiety. If in this population we also fail to observe differences as seen in the adult population then it would suggest that the mechanisms underlying social anxiety may be different in adolescents and adults. In the present study, we examined the perceived and actual effects of negative self-imagery compared to benign self-imagery during a conversation task using a within-subjects design. Three sources of outcome data were compared: self-report, conversation partner-report, and independent assessor ratings.

Recruitment

Ethical approvals and consent/assent procedures

The study received ethical approval from the University of Oxford Medical Sciences Division Ethics Committee (CUREC Reference: R54283/RE001). Written parental consent and written young person assent were obtained for participation in the study.

Sample size estimation

Power analysis was conducted *a priori* with reference to two studies that used similar experimental designs, one with a sample of socially anxious undergraduates and one with a clinical adult sample (Hirsch et al., 2003; 2004). The calculation estimated that in order to detect a difference between the imagery conditions with $p < .05$ and 80% power, 30 participants or more were required to test the probability of rejecting the null hypothesis when it is false. We increased the sample size to n = 34 given the differences in population.

Recruitment procedure

Participants were recruited via a screening program undertaken in two secondary schools. All pupils in UK school years 7–9 (aged 11–14 years) were invited to take part. As part of the screening they completed a measure of social anxiety (the self-report version of the Liebowitz Social Anxiety Scale for Children and Adolescents, LSAS-CA [15]). Pupils who scored in the top quartile of the distribution of scores for their year group on the LSAS-CA were invited to take part. The LSAS-CA was repeated at the experimental testing session, and any participant whose score had changed such that they were no longer scoring within the upper quartile for their year group were not included ($n = 0$).

Methods

Design

High socially anxious participants had two conversations with a naïve conversation partner (gender-matched with participants). In one condition they held a negative self-image in mind and in the other they held a benign self-image in mind. The order of imagery condition was counterbalanced across participants. After each conversation, participants rated their anxiety and how well they thought they performed, and completed manipulation checks. They also completed questionnaires assessing safety behaviour use and observable aspects of behaviour. Conversation partners rated participants' performance, the conversation and their own anxiety after each conversation. Participants and conversation partners also both completed a questionnaire assessing the quality of the conversation. The conversations were videotaped and an

independent assessor blind to the study aims and experimental manipulation rated the interaction on the conversation quality questionnaire.

Participants

Participants. 34 young people, 22 of whom were female, served as the experimental participants. Their average age was 13.55 (*SD* = 0.88), ranging from 11.85 to 14.79 years. The average total score on the LSAS-CA was 71.03 (*SD* = 27.57), ranging from 21 to 116. The mean score on the Short Mood and Feelings Questionnaire (18) was 9.91 (*SD* = 5.58), ranging from 2 to 22.

Conversation partners. Six psychology students (50% female) served as the conversation partners. It was explained to them that they were helping with a psychology study about adolescents, but they were naïve to the specific study aims and manipulation. Their average age was 22 years (*SD* = 3.36; range = 16–24), and the average LSAS score was 26 (*SD* = 12.01; range = 11–39).

Manipulation of imagery

Each participant generated two images: One that they typically experienced in socially anxious situations (the 'negative' image) and the other that they experienced when they felt relaxed or less anxious (the 'benign' image). The procedure to generate the images was the same as that reported by Hirsch et al. [4, 5], based on Hackmann et al. [1]. Minor adaptations were made and piloted to ensure the instructions were appropriate for adolescents. The procedure involved two stages; a situation was identified and then the associated image was elicited. For the negative image condition, participants recalled a social situation when they had felt anxious, and for the benign image they recalled a social situation when they had felt relaxed. Once the situation had been identified, the associated image was elicited by asking participants a series of questions about how they felt they looked and sounded, felt, and how they came across to others in the situation.

Materials

Social anxiety symptoms were measured with the self-report version of the 24 item Liebowitz Social Anxiety Scale for Children and Adolescents, LSAS-CA [15], which ranges from 0 to 144 (with higher scores indicating more social anxiety symptoms). Psychometric properties of the scale are sound [16] and internal consistency in the current study was high (Cronbach's α = .95).

Depression symptoms were measured with the short form of the Mood and Feelings Questionnaire (SMFQ [17]). Internal consistency in the present sample was high (Cronbach's α = .86).

Three visual analogue scale (VAS) ratings were included as *Manipulation Checks*. Participants were asked to rate: how able they were to hold the image in mind during the conversation (range = 0–100); the clarity of the image (range = 0–100); and the valence of the image (from -3, totally negative, to +3, totally positive).

Anxiety and Performance Ratings were made after each conversation on VAS. Participants were asked to rate how anxious they felt and how anxious they thought they appeared (from 0 'not at all anxious' to 100 'very severely anxious'). Lastly, they were asked how well the conversation went overall (from 0 'not at all well' to 100 'really well').

Sixteen items assessing safety behaviour use were taken from the *Adolescent Social Behaviour Questionnaire (ASBQ*; each item is scored on a 4-point scale ranging from 0–3, adapted from the adult version [18]). Participants completed these 16 items twice during the study, once after each conversation. They were asked to make their ratings based on what they had

done during the preceding conversation only. Internal consistency was high (Cronbach's α = .93). In line with Hirsch et al. [4], items on the ASBQ were divided into two categories, 'Avoidance' (10 items; Cronbach's α = .89) and 'Impression Management' (6 items; Cronbach's α = .89).

The self-report version of the *Behaviour Questionnaire* developed by Hirsch et al. [4] was completed after each conversation. The questionnaire measures observable aspects of behaviour, with higher scores indicating more observable anxiety and poorer performance. Total scores (Cronbach's α = .91) and subscales for specific negative (Cronbach's α = .81), global negative behaviours (Cronbach's α = .83) and positive behaviours (Cronbach's α = .83) were calculated.

Conversation Partner Ratings were obtained after each conversation on the following scales: how anxious the participant appeared (from 0 'not at all anxious' to 100 'very anxious'); how enjoyable the conversation was (from 0 'not at all enjoyable' to 100 'extremely enjoyable'); how likeable they found the participant (-50 'less likeable than average' to +50 'more likeable than average'); and the conversation partner's own anxiety (from 0 'not at all anxious' to 100 'very anxious').

The 12-item *Conversation Questionnaire* was completed by both participant and conversation partner after each conversation. It was developed by Hirsch et al [4] and assesses various aspects of the conversation, such as flow, pauses, and reciprocity. Higher scores indicate a more critical evaluation of the conversation (Self-report Cronbach's α = .86; Conversation partner Cronbach's α = .88; Independent rater Cronbach's α = .94). An independent rater (psychology graduate) also scored the conversations on the *Conversation Questionnaire*, modified for observer rating (e.g. '*I interrupted the conversation partner*' changed to '*The participant interrupted the conversation partner*'). The rater demonstrated excellent interrater reliability on a subsample of 50% of the videos rated by the lead author (r = .95), and the internal consistency of the scale was high (α = .95).

Procedure

Testing took place in school during school hours. Before beginning, it was explained to conversation partners that they would be taking part in brief conversations with young people. They were asked to imagine that they were meeting them for the first time at a family party or social event. They were instructed not to talk about the experiment during the conversation. Participants initially completed the LSAS-CA and the SMFQ. They were allocated to 'Negative—Benign' or 'Benign—Negative' imagery conditions in counterbalanced order. They then underwent the manipulation (see *Manipulation of imagery* for details). Participants were asked to continue following the instructions during the conversation with the conversation partner whom they had not met before. Participants were given a conversation topic (either 'Entertainment' or 'Holidays', these were assigned in counterbalanced order within conditions). The conversation partner was unaware of the study design. The conversation partner was also given the conversation topic. The participant and stooge were introduced to one another and the experimenter sat discreetly in the room during the conversation. Each conversation lasted 5 minutes. After each conversation, participants completed *Manipulation Checks, Anxiety and Performance Ratings, ASBQ Items, Behaviour Questionnaire*, and *Conversation Questionnaire*. The conversation partner completed *Conversation Partner Ratings* and *Conversation Questionnaire*. At the end of the session participants were thanked for their time and debriefed.

Data analysis

To compare the effects of negative and benign imagery on self-report ratings, MANOVA were undertaken, with one within-subjects factor, (Condition (Negative and Benign)) and one between-subjects factor (Order (Negative-Benign and Benign- Negative)).

To examine the extent to which participants overestimated how anxious they looked, we calculated a difference score (self-reported anxious appearance minus conversation partner reported anxious appearance) in the negative and benign imagery conditions, and compared these in an ANOVA.

To examine whether there were observable effects of negative compared to benign imagery, MANOVA were undertaken on conversation partner ratings, with one within-subjects factor, (Condition (Negative and Benign)) and one between-subjects factor (Order (Negative-Benign and Benign- Negative)). To examine the effects of negative and benign imagery on Conversation Questionnaire ratings, a 3-way ANOVA was run, which included Rater as a within-subjects factor (Participant, Conversation Partner, Observer), as well as Condition and Order factors.

All MANOVA and ANOVA were run with Topic Order as a further between subjects variable (Holidays–Entertainment vs. Entertainment–Holidays). No main effects or interactions were significant and therefore analyses are reported without the inclusion of this factor.

To examine the hypothesis that the detrimental effect of negative imagery on participants' social performance is due to avoidant safety behaviours, we undertook mediation analyses of the effect of negative (vs. benign) imagery on conversation partner-rated and observer-rated conversation quality, with avoidant and impression management safety behaviours as separate mediators.

Results

Manipulation checks. Table 1 summarises means and standard deviations, and test statistics. MANOVA revealed no significant main effects or interactions for clarity of the image, or ability to hold the image in mind, suggesting participants rated themselves as able to comply with instructions equally well in both conditions. As expected, there was a main effect of condition on the valence of the image, with more negative images reported in the negative imagery condition. No other main effects or interactions were significant.

Self-report ratings. Means and standard deviations are shown in Table 1. There was a main effect of condition across all Anxiety and Performance Ratings, with participants rating themselves as feeling and looking less anxious, and coming across better in the benign imagery condition. There was a significant main effect of condition on the Behaviour Questionnaire, with more critical ratings in the negative imagery condition, for the total and subtotal scores. Participants reported using significantly more safety behaviours (total and subtypes) in the negative imagery condition. No other effects were significant.

Overestimation of anxious appearance. ANOVA revealed a significant main effect of condition, with participants overestimating how anxious they appeared more when holding a negative image in mind compared to a benign image (see Table 1). No other main effects or interactions were significant.

Conversation partner ratings. There was a significant main effect of condition on all Conversation Partner Ratings, see Table 1, with more critical ratings in the negative compared to the benign condition. No other effects were significant.

Conversation Quality Questionnaire (Self, Conversation Partner, and Observer Rated). Three-way ANOVA revealed a main effect of condition ($F(1, 32) = 41.69$, $p < .01$, $\eta_p^2 = .57$), with the conversation rated more negatively for the negative compared to the benign imagery condition by participants (see Table 1 for means and standard deviations). No other effects were significant.

Mediation analysis. Mediation analyses were undertaken to examine the effect of negative (vs. benign) imagery (Y) on conversation partner-rated and observer-rated conversation quality (X), with avoidant and impression management safety behaviours as separate mediators

Table 1. Means and standard deviations for outcome variables in the negative and the benign imagery conditions, with test statistic and estimate of the effect size for this contrast (Multivariate tests revealed the only significant effect was Condition, therefore results of the univariate tests for this contrast only are presented).

Measure	Condition		Test Statistic	*p* value	Partial eta^2 (η_p^2)
	Negative Imagery Mean [SD]	Neutral Imagery Mean [SD]			
Manipulation Checks					
Held image in mind (0–100)	69.71 [21.67]	73.24 [19.61]	$F(1, 32) = 0.53$	.47	0.02
Valence (-3 - +3)	-1.60 [0.95]	2.09 [0.61]	$F(1, 32) = 292.89$	< .001	0.90
Clarity (0–100)	60.44 [24.07]	59.41 [22.01]	$F(1, 32) = 0.04$	.85	0.00
Self-Report Anxiety and Performance Ratings					
Feel anxious (0–100)	65.44 [16.44]	26.32 [16.98]	$F(1, 32) = 155.94$	< .01	0.83
Look anxious (0–100)	70.15 [18.57]	32.65 [20.24]	$F(1, 32) = 102.73$	< .01	0.76
How well the conversation went (0–100)	48.53 [21.59]	76.24 [18.08]	$F(1, 32) = 57.37$	< .01	0.64
Overestimation of Anxious Appearance	16.03 [32.14]	-1.03 [27.57]	$F(1, 32) = 15.10$	< .01	0.32
Behaviour Questionnaire					
Total Score	65.06 [18.22]	31.44 [16.05]			
Global Negative Behaviour	28.32 [7.79]	13.56 [7.31]	$F(1, 32) = 155.32$	< .01	0.83
Specific Negative Behaviour	14.53 [6.97]	6.97 [5.84]	$F(1, 32) = 68.45$	< .01	0.68
Positive Behaviour	22.21 [7.26]	10.91 [5.77]	$F(1, 32) = 104.97$	< .01	0.77
Safety Behaviour Questionnaire					
Total	69.24 [22.67]	45.71 [21.59]	$F(1, 32) = 105.01$	< .01	0.77
Avoidance Behaviours	41.50 [15.23]	24.12 [13.71]	$F(1, 32) = 98.18$	< .01	0.75
Impression Management	27.74 [9.56]	21.59 [9.36]	$F(1, 32) = 36.02$	< .01	0.53
Conversation Partner Ratings					
Enjoyed conversation (0–100)	43.24 [22.22]	63.68 [20.35]	$F(1, 32) = 26.04$	< .01	0.45
Participant looked anxious (0–100)	54.12 [26.04]	33.68 [24.00]	$F(1, 32) = 28.31$	< .01	0.47
Liked the participant (-50 - +50)	2.50 [18.84]	15.88 [19.36]	$F(1, 32) = 29.17$	< .01	0.48
Own feelings of anxiety (0–100)	27.50 [23.72]	20.00 [18.22]	$F(1, 32) = 8.50$	< .01	0.21
Wanted to continue conversation (0–100)	40.88 [22.34]	62.06 [23.71]	$F(1, 32) = 28.37$	< .01	0.47
Conversation Questionnaire Ratings					
Participant Rater	45.19 [13.10]	26.90 [11.22]			
Conversation Partner Rater	45.26 [13.52]	32.90 [15.99]	see text		
Independent Rater	34.32 [20.43]	21.84 [14.39]			

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(M). The direct, indirect, and total effects were estimated using the MEMORE macro for SPSS [19]. The magnitude and 95% confidence intervals of the indirect effects were estimated (using 5000 bootstrap resamples, with replacement). Significance of the indirect effect was indicated by the 95% confidence interval not crossing zero.

In line with the hypotheses, the indirect (mediation) effect for the Avoidance subscale of the ASBQ was significant (bootstrap coefficient = 10.58, *SE* = 4.13), with a 95% confidence interval ranged from 2.52 to 18.91, for the conversation partner rated conversation questionnaire, and also for the observer rated conversation questionnaire (bootstrap coefficient = 1.02, *SE* = 0.46, [95% CI: 0.05, 1.88]). Also in line with hypotheses, the indirect (mediation) effect for the Impression Management subscale of the ASBQ was not significant for either the partner (bootstrap coefficient = 1.27, *SE* = 2.43, [95% CI: -2.93, 6.90]), or the observer rated conversation questionnaire (bootstrap coefficient = 0.22, *SE* = 0.30, [95% CI: -0.26, 0.90]).

Discussion

Identifying cognitive processes that maintain adolescent social anxiety and that are modifiable is important because it provides a route to optimising treatments. Negative self-imagery, that

we know is causally implicated in adult social anxiety, is one such candidate process. However, whilst previous research with adolescents has demonstrated that negative self-imagery is associated with social anxiety, the only experimental study undertaken in adolescents reported no effect of manipulating imagery in healthy volunteers [14]. We were interested to examine whether this is because negative self-imagery operates differently in adolescents compared to adults, or whether the null finding is related to design issues. Therefore, in the present study we experimentally manipulated self-imagery in high socially anxious adolescents. We found that holding a negative image in mind did have a detrimental effect across self-report, conversation partner, and independent assessor ratings. The findings provide the first direct evidence that negative self-imagery is causally implicated in social anxiety in adolescents as it is in adults, rather than an epiphenomenon or consequence.

High socially anxious adolescents reported feeling more anxious when holding a negative self-image in mind compared to a benign image. They also thought that they came across less well and that the conversation was less successful, for example, that there were more pauses and it flowed less well. Participants thought that they looked more anxious, with higher ratings of observable aspects of anxiety, such as fidgeting and blushing when holding a negative image in mind.

Our findings suggest that the more critical self-judgements associated with holding a negative compared to a benign image in mind are a result of distorted perception and also partly based in reality. The extent to which participants have a distorted perception of how they come across can be measured by comparing self and conversation partner ratings of anxious appearance. What we find is that when adolescents hold a negative image in mind, they overestimate how anxious they look. This is in contrast to the fairly accurate assessment they make of their anxious appearance when holding a benign image in mind. The present data suggests that the use of internal information, such as negative self-imagery, is associated with this distortion when holding a negative image in mind. It raises the question of whether socially anxious adolescents use other internal information to infer how they come across, in addition to self-imagery. For example, there is evidence to suggest that socially anxious adults use physical sensations of anxiety to (over) estimate how anxious they look [20]. This hypothesis has not yet been tested in adolescents.

There is also some reality to participants' critical self-judgements. Conversation partners and the independent observer, naïve to the study design, also rated the conversation more critically when the participant held a negative image in mind. They rated the conversation as less reciprocal, interesting and enjoyable, and conversation partners rated the participant as looking more anxious. As images are internal events, it may seem surprising that they influence the way our behaviour is rated by other people. How could self-imagery affect observable behaviour? It could be that participants felt much more anxious in the negative image condition and the visible effects of anxiety affected the whole interaction. Another possibility is that it is due to the contaminating effect of safety behaviours, and avoidant safety behaviours in particular. Indeed, in the negative imagery condition, participants reported using more safety behaviours in general compared to the benign imagery condition, despite no instructions to do so, and so it seems that negative self-imagery motivates the spontaneous use of safety behaviours in socially anxious adolescents.

It may be that the increase in safety behaviour use, and avoidant safety behaviours in particular, impacts on how other people experience the conversation. Our preliminary mediation analysis suggests that this may be the case: avoidant but not impression management safety behaviours mediated the relationship between negative imagery and both conversation partner and observer ratings of the conversation quality. By way of example, a socially anxious adolescent who stands on the edge of the group, avoiding eye contact and declining to ask any

questions for fear of stumbling over their words and appearing stupid, will be perceived more critically by others. This is a sad irony, because this is the opposite message that they are trying to communicate. However, it is important to note that our sample size was substantially lower than what is considered optimal for mediation analysis [21]. Therefore this finding could be a false positive and replication with a larger sample size is needed. We have previously suggested that adolescents may rely more heavily on avoidant safety behaviours rather than impression management strategies, compared to adults [22]. If this were borne out in future studies, then it would suggest that socially anxious adolescents are particularly vulnerable to becoming caught in vicious cycles of anxiety, safety behaviour use, and peer rejection.

Importantly, the manipulation used in the study appears to be robust. Participants were able to hold a clear and vivid image in mind throughout the task, with no differences between conditions except for valence of the image, as intended. These ratings suggest that adolescents (at least those aged 11–14 years), like adults, are able to generate an image of themselves and hold this in mind, but also that the valence can be explicitly manipulated. Extending beyond this study, future research examining if and how the relationship between imagery and social anxiety changes during the course of childhood and adolescence will be important, given that competence in mental imagery (i.e. in the ability to generate, inspect, maintain and manipulate images [23]), is likely to develop over the course of this period [9].

The study is not without its limitations. Whilst the study was adequately powered, the sample size was modest. In addition, we note that conversation partners were on average nine years older than participants, which may limit generalisability to an extent, and future studies with similar-aged peers as conversation partners would be valuable. For example, it may be that other adolescents, who as a group are typically sensitive to social reward and rejection, may be more affected by social anxiety- related avoidant behaviours than adults. Furthermore, we note that baseline ratings of anxiety and related self-report measures were not gathered. It would be interesting to chart whether changes from baseline across time may have differed between conditions.

The present study has yielded consistent findings pointing to the detrimental effect of negative imagery in social anxiety for adolescents. Although the sample was not drawn from a clinical population, participants' average score on a measure of social anxiety (LSAS-CA) was high ($M = 71.03$ [$SD = 27.57$]) and the participant with the lowest LSAS-CA scored 21 (and the next lowest LSAS-CA score was 30), which is only marginally below the suggested threshold (22.5) for distinguishing adolescents with social phobia and healthy controls [16]. Taken together, this suggests that the findings from this study can be informative about clinical interventions for socially anxious adolescents. Techniques to target negative imagery may be beneficial, for example the use of video feedback to correct distorted images is a core technique in Cognitive Therapy for social anxiety in adults, e.g. [24], and shows promise for adolescents [25, 26]. Specific support for the use of this technique with adolescents came from a study by Parr and Cartwright-Hatton [27]. Compared to a control condition, they demonstrated that video feedback with careful verbal preparation (see also [6]) led to reductions in anxiety and more positive predictions amongst socially anxious teenagers.

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PLOS ONE

RESEARCH ARTICLE

Self-focused attention and safety behaviours maintain social anxiety in adolescents: An experimental study

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Abstract

Background

Self-focused attention and safety behaviours are both associated with adolescent social anxiety. In adults, experimental studies have indicated that the processes are causally implicated in social anxiety, but this hypothesis has not yet been tested in a youth sample.

Methods

This experiment explored this possibility by asking high and low socially anxious adolescents (N = 57) to undertake conversations under different conditions. During one conversation they were instructed to focus on themselves and use safety behaviours, and in the other they focused externally and did not use safety behaviours. Self-report, conversation partner report and independent assessor ratings were taken.

Results

Self-focus and safety behaviours increased feelings and appearance of anxiety and undermined performance for all participants, but only high socially anxious participants reported habitually using self-focus and safety behaviours.

Conclusions

The findings provide support for the causal role of self-focus and safety behaviours in adolescent social anxiety and point to the potential clinical value of techniques reversing them to treat the disorder.

Introduction

Social anxiety disorder (SAD) is a common and impairing condition [1, 2], characterised by a low natural recovery rate [3] and adolescent-onset [4]. Developing effective early interventions

Abbreviations: SA, Social anxiety; SAD, Social Anxiety Disorder; VAS, Visual Analogue Scales.

has the potential to offset the long-term consequences associated with the disorder [5]. Unfortunately, whilst outcomes from standard psychological treatment approaches are promising for most common anxiety problems in youth, they are significantly worse for youth with SAD (e.g. Hudson, Rapee [6], Ginsburg, Kendall [7], Crawley, Beidas [8], Lundkvist-Houndoumadi and Thastum [9]). Establishing psychological mechanisms of social anxiety in youth that can be reversed in treatment may be one way to improve outcomes for this population [10].

Two of the processes that are emphasised in leading cognitive behavioural accounts of social anxiety in adults [11–14] are self-focused attention and safety behaviours. For example, in the model of Clark & Wells (1995), it is proposed that when entering a social or performance situation, socially anxious adults turn their attention inward, to close monitoring of themselves and how they think they are coming across. This is unhelpful because it prevents the individual from discovering how others are responding to them. It also increases awareness of internal information, such as physical feelings of anxiety and mental images, which the individual may then take as confirmation of their negative beliefs. Safety behaviours are strategies, many of which are mental operations, that are intended to prevent or minimise feared outcomes from occurring [15]. For example, an individual may avoid answering a question for fear of getting the answer wrong and appearing stupid. It is suggested that safety behaviours are unhelpful for a number of reasons. They prevent the individual from discovering that the feared outcome was unlikely and/or not catastrophic; they intensify self-focus; they may increase feared symptoms; they can draw attention to feared symptoms; and they can also interfere with the social interaction, for example, not answering a question may be perceived as unfriendly, and so elicit less friendly reactions from others.

Empirical support for the causal role of self-focused attention and safety behaviours in adults comes from experimental studies that have manipulated these variables (see Piccirillo, Taylor Dryman [16] and Norton and Abbott [17] for reviews of safety behaviours and self-focused attention, respectively). Two studies manipulated self-focused attention and safety behaviours simultaneously. In the first study with a sample of adults drawn from an analogue population, McManus, Sacadura, & Clark [18] demonstrated that experimentally manipulating self-focus and safety behaviour use during a conversation task modulated participants' experience of anxiety and appraisals of their performance, as well as affecting how the participant objectively came across to others. The second study evaluated the effects of this experimental manipulation with a clinical sample of adults as part of cognitive therapy treatment [19]. Patients felt more anxious, thought they appeared more anxious, and came across worse when they focused on themselves and used safety behaviours. This consistent finding was used in subsequent therapy sessions to encourage patients to shift to a more external focus of attention in everyday social interactions and to drop their safety behaviours in order to more effectively test their anxiety provoking expectations.

The question of whether these same processes are present and causally related to social anxiety in adolescents remains relatively unexplored. However, it cannot be assumed that the maintenance processes in adult and adolescent social anxiety are the same, due to reasons such as ongoing cognitive maturation [20], the changing social environment, and heightened sensitivity to social reward [21] during adolescence [10]. A small number of correlational studies examining the association between the two candidate processes and social anxiety symptoms were identified in a recent systematic review of the literature pertaining to the applicability of the Clark & Wells' cognitive model in adolescents [10]. A moderate association between self-focused attention and social anxiety was reported in three of the four relevant studies [22–25], and a moderate to large association between safety behaviours and social anxiety was found in four studies [22, 23, 26, 27]. Taken together these findings suggest that self-focused attention and safety behaviours co-vary with adolescent social anxiety. Whilst the data is consistent with

a causal account, experimental studies are needed in order to comprehensively test the hypothesis. To our knowledge, as yet no studies have been undertaken with adolescents.

Here, we describe an experimental study manipulating self-focus and safety behaviours during a conversation task in high and low socially anxious youth. The effects on self-reported anxiety and performance, conversation-partner ratings, and independent assessor ratings are examined. We tested three main hypotheses in the study: first, that that self-focus and safety behaviours would increase feelings and appearance of anxiety; second, that the detrimental effects of safety behaviours and self-focus would be evident in both high and low socially anxious adolescents, because the safety behaviours employed are typical of those with SAD [26]; and third, that self-focus and safety behaviours would undermine performance, as reflected in more critical judgements by conversation partners and independent observers.

Methods

Ethical approvals and consent/assent procedures

The study received ethical approval from the University of Oxford Medical Sciences Division Ethics Committee (CUREC Reference: R54283/RE001). Parental consent and young person assent were obtained for participation in the study.

Recruitment procedure

Participants were recruited via a screening program undertaken in two secondary schools. All pupils in school years 7–9 (11–14 y) were invited to take part. As part of the screening they completed a measure of social anxiety (the self-report version of the Liebowitz Social Anxiety Scale for Children and Adolescents, LSAS-CA [28]). Those pupils whose scores on the LSAS-CA fell in the top or bottom quartile of the distribution of scores for their year group were invited to take part. The LSAS-CA was repeated at the experimental testing session, and any participant whose score had changed such that they were no longer scoring within their allocated quartile for their year group were not included ($n = 0$).

Design

High and low socially anxious (SA) participants had two conversations with a naïve conversation partner (gender-matched with participants). In one condition they were instructed to use an agreed set of common safety behaviours and focus on themselves and in the other to focus externally and not use these safety behaviours. The order of condition was counterbalanced within groups and the order of conversation topic was counterbalanced within condition within group. Participants rated their anxiety and how well they thought they performed, and completed manipulation checks after each conversation. Conversation partners rated the participants' performance, the conversation, and their own anxiety. The conversations were also videotaped and independent assessors rated the interaction.

Participants

Experimental participants. Table 1 provides summary statistics for the high (N = 28) and low (N = 29) SA groups and the total sample. The average age of the sample was 12.75 years (SD = 0.75; min = 11.74 max = 14.58), with no differences between groups. The number of females and males was comparable. As would be expected, the high SA group endorsed significantly higher social anxiety (LSAS-CA) and depression (SMFQ) scores. Their average use of safety behaviours (ASBQ) was significantly higher and they reported being more self-focused (SPWSS item) in social situations.

Table 1. Descriptive statistics of participants.

	High Anxiety N = 28	Low Anxiety N = 29	Total N = 57	Statistical Test
	M [SD]	M [SD]	M [SD]	*t* test
Age (y)	12.88 [0.76]	12.64 [0.73]	12.75 [0.75]	$t(55) = -1.24$, $p = 0.22$
LSAS Anxiety[1]	38.46 [14.36]	4.29 [3.80]	21.38 [20.14]	$t(54) = -12.17$, $p<0.001$
LSAS Avoidance[1]	36.32 [14.93]	5.04 [4.34]	20.68 [19.18]	$t(54) = -10.64$, $p<0.001$
LSAS Total[1]	74.79 [28.44]	9.32 [6.90]	42.05 [38.88]	$t(54) = -11.84$, $p<0.001$
SMFQ Total[1]	10.61 [6.68]	2.11 [1.91]	6.36 [6.49]	$t(54) = -6.47$, $p<0.001$
ASBQ[1]	1.42 [0.42]	0.74 [0.44]	1.05 [0.55]	$t(47) = -5.55$, $p<0.001$
SPWSS Item[1]	4.15 [2.28]	3.00 [1.66]	3.57 [2.06]	$t(52) = -2.21$, $p<0.05$
	N	N	N	χ^2 Test
Gender (F)	18	18	36	$\chi^2(1) = 0.30$, $p = 0.86$

LSAS: Liebowitz Social Anxiety Scale for Children & Adolescents–Self-Report Version; SMFQ: Short Mood & Feelings Questionnaire; ASBQ: Adolescent Social Behaviour Questionnaire; SPWSS: Social Phobia Weekly Summary Scale.

[1]N = 56 for LSAS and MFQ (High = 28, Low = 28); N = 50 for ASBQ (High = 23, Low = 27); N = 54 for SPWSS item (High = 27, Low = 27).

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Conversation partners. 10 psychology students (50% female) served as the conversation partners. It was explained to them that they were helping with a psychology study about adolescence, but they were naïve to the specific study aims and manipulation. Their average age was 20.50 years (SD: 3.17; range: 16–24), and the average LSAS score was 31.80 (SD: 15.37; range: 3–48).

Manipulation of self-focused attention and safety behaviours

The instructions for the self-focus and safety behaviours manipulation were consistent with those used in the study of McManus, Sacadura, & Clark (2008). Minor adaptations were made to ensure they were appropriate for adolescents and these were piloted with N = 5. For the 'With' self-focus and safety behaviours condition they were as follows: "*Focus on yourself and watch yourself during this conversation. Think about how you are coming across to the other person. And because you are really thinking about how you are coming across, we also want you to be careful about what you say, thinking about whether it is the right thing to say. And check on that as you go along, deciding whether it is good enough to say before you say it.*". The instructions for the 'Without' self-focus and safety behaviours condition were: "*Focus on the other person. Don't think about yourself or how you're coming across. Just be your natural self and respond to whatever the other person says without thinking about that. Say whatever comes to mind. Absorb yourself in the conversation, focusing on the other person. As if it is the most interesting conversation you have ever had.*"

Materials

Self-report questionnaires. *Social anxiety symptoms* were measured with the self-report version of the 24 item Liebowitz Social Anxiety Scale for Children and Adolescents, LSAS-CA [28]. Psychometric properties of the scale are sound [29] and internal consistency in the current study was high (Cronbach's $\alpha = .95$).

Depression symptoms were measured using the *Short Mood and Feelings Questionnaire* (*SMFQ*) [30]. Internal consistency in the present study was high (Cronbach's $\alpha = 0.93$).

The *Child & Adolescent Social Behaviour Questionnaire (ASBQ)* is a 29-item scale of common social safety behaviours (adapted from the adult version of the scale [31]). Respondents are asked how often they tend to use each safety behaviour in social situations when they feel

anxious on a 4-point scale (range: 0–3) and a mean score is calculated. This was included to examine whether there were group differences in habitual safety behaviour use. Internal consistency was good in the present study (Cronbach's $\alpha = 0.74$).

One item was taken from the *Social Phobia Weekly Summary Scale (SPWSS*; [32]) assessing self-focused attention in difficult social situations (range: 0–8). This was included to examine whether there were group differences in habitual use of self-focused attention in social situations.

Manipulation Checks were made with two single item visual analogue scales (VAS). To assess the degree of self-focus, participants were asked to rate "How focused were you on yourself (and how you were coming across) or on the conversation and the other person/people?" after each conversation, from -3 ('totally self-focused') to +3 ('totally focused on the outside'). Participants were also asked to rate the extent to which they had been able to follow the instructions, from 0 (not at all) to 100 (totally).

Anxiety and Performance Ratings were made after each conversation on VAS. Participants were asked to rate how anxious they felt and how anxious they thought they appeared (from 0 'not at all anxious' to 100 'very severely anxious'). Before the first conversation, participants were asked what their worst fear was for the conversation. After each conversation, they were asked to rate how much they believed their negative prediction to have occurred (from 0 'not at all' to 100 'totally'). They were asked how well the conversation went overall (from 0 'not at all well' to 100 'really well'). Lastly, they were also asked whether or not they had experienced a negative image of how they came across (yes/no).

Conversation Partner Ratings were obtained after each conversation on the following scales: how anxious the participant appeared (from 0 'not at all anxious' to 100 'very anxious'); how enjoyable the conversation was (from 0 'not at all enjoyable' to 100 'extremely enjoyable'); and how likeable they found the participant (-50 'less likeable than average' to +50 'more likeable than average').

Independent observer ratings of performance were made on a modified version of the Conversation Questionnaire [33]. The questionnaire assesses various aspects of the conversation, such as flow, pauses, and reciprocity, and higher scores indicate a more critical evaluation of the conversation. Minor adaptations were made for use in the present study, to account for an independent rater rather than a conversation partner rater (e.g. "*I interrupted the other person*" was changed to "*The participant interrupted the other person*."). Items are rated from 0 ('not at all') to 8 ('extremely'). One psychology graduate blind to the condition rated all recorded interactions. The rater demonstrated excellent interrater reliability on a subsample of 50% of the videos rated by the lead author (*ICC* = .95, 95% CI: .93-.96).

Procedure

Testing took place in school hours. Before beginning, it was explained to conversation partners that they would be taking part in brief conversations with young people. They were asked to imagine that they were meeting them for the first time at a family party or social event. They were instructed not to talk about the experiment during the conversation. It was explained to participants that they were participating in a study to find out how young people think and feel in social situations. Participants initially completed the self-report questionnaires. Participants were allocated to the 'With' self-focused attention and safety behaviours or 'Without' in counterbalanced order within groups. Prior to the first conversation, participants were asked to identify their worst fears for a conversation with a stranger and what safety behaviours they would normally use to avoid these feared outcomes. They then underwent the self-focused attention and safety behaviour manipulation. Participants were asked to continue following

the instructions throughout the following conversation with the conversation partner whom they had not met before. Participants were given a conversation topic (either 'Hobbies' or 'Holidays', these were assigned in counterbalanced order within conditions within groups). The conversation partner, who was unaware of the study design, was also given the conversation topic. The participant and conversation partner were introduced to one another and the experimenter sat discreetly in the room during the conversation. Each conversation lasted 5 minutes. After each conversation, participants completed *Manipulation Check* items, *Anxiety and Performance Ratings* and the conversation partner completed *Conversation Partner Ratings*. At the end of the session participants were thanked for their time and debriefed.

Results

Data analysis

A series of linear mixed models was conducted on the self-report, conversation-partner report, and independent assessor ratings. Condition and group were included as fixed factors, and the interaction between condition and group. Conversation partner was included as a random effect. To test for possible condition order effects, all models were first run with this variable included as a fixed factor, with the two- and three-way interactions. The covariance structure matrix was unstructured, and Maximum Likelihood was used for model estimation. All analyses were conducted using R [34]. Significance was considered at $p < .05$, two-tailed.

Means and standard deviations for the variables included in the following analysis are presented in Table 2.

Linear mixed-effects models analyses

Results of linear mixed models excluding condition order as a fixed factor are presented because no significant order effects or interactions were observed.

Manipulation checks. As shown in Table 3, participants were more self-focused in the 'With' condition, as intended. High, compared to low, socially anxious participants were more self-focused in general. Participants were more able to follow instructions in the 'Without' condition, and there was a significant interaction effect between condition and group. Post-hoc Tukey HSD tests showed that low socially anxious adolescents reported following the instructions more in the 'Without' condition than in the 'With' condition ($p < .001$). There were no significant differences in compliance for high socially anxious adolescents between conditions ($p = .69$). The high socially anxious adolescents reported significantly lower compliance in the 'Without' condition ($p < .001$) compared to the low socially anxious participants.

Self-report anxiety and performance ratings. Table 4 shows that there was a main effect of condition across all anxiety and appraisal ratings, with participants in the 'With' condition as feeling more anxious, believing they appeared more anxious, believing more strongly their feared prediction had occurred, and thinking they did less well. There was also a main effect of group across all the ratings, with high socially anxious adolescents feeling more anxious and believing they appeared more anxious, believing more strongly that their feared prediction had come true, and thinking that they had come across less well. No interaction effects were significant.

After each conversation, participants were asked whether they had experienced a negative self-image. In the 'With' condition, 17/28 (61%) of the high social anxiety group and 11/29 (38%) of the low social anxiety group experienced a negative image. In the 'Without' condition, 4/28 (14%) and 0/29 (0%) of the high and low groups, respectively, reported a negative image. McNemar's test indicated that significantly more negative images were experienced in the 'With' compared to the 'Without' condition ($p < .001$).

Table 2. Means and standard deviations for the high and low social anxiety groups in the 'With' and 'Without' conditions.

Measure	Social Anxiety Group	Condition	
		With safety behaviours and self-focus (N = 57)	Without safety behaviours and self-focus (N = 57)
Manipulation Checks			
Self-focus (-3 –+3)			
	Low	-0.47 (0.88)	1.78 (1.18)
	High	-1.45 (1.23)	0.66 (1.27)
Followed instructions (0–100)			
	Low	58.21 (21.16)	82.86 (15.88)
	High	65.36 (21.17)	60.00 (18.81)
Participant Anxiety and Performance Ratings			
Feel anxious (0–100)			
	Low	35.69 (21.46)	10.48 (12.00)
	High	66.61 (16.50)	41.79 (23.26)
Look anxious (0–100)			
	Low	43.45 (24.06)	11.55 (15.55)
	High	64.11 (18.76)	39.82 (21.58)
Belief (0–100)			
	Low	23.55 (25.57)	9.14 (16.26)
	High	57.14 (28.46)	32.68 (24.66)
How well the conversation went (0–100)			
	Low	61.83 (23.94)	83.59 (12.34)
	High	43.21 (22.29)	55.89 (18.91)
Perceiver Ratings			
Participant looked anxious (0–100)			
	Low	45.17 (26.41)	28.97 (23.35)
	High	67.50 (28.63)	50.36 (27.01)
Enjoyed conversation (0–100)			
	Low	67.24 (21.20)	76.90 (15.83)
	High	49.64 (25.46)	64.29 (23.32)
Liked the participant (-50 –+50)			
	Low	19.14 (16.48)	26.21 (12.65)
	High	11.07 (16.85)	17.50 (16.24)
Observer Ratings			
Conversation Questionnaire (0–96)			
	Low	20.16 (13.64)	9.89 (10.62)
	High	40.24 (16.69)	24.33 (13.93)

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Conversation partner ratings. Table 5 shows that there was a main effect of condition on two of the three of the conversation partner report ratings, with conversation partners rating participants in the 'Without' condition as looking less anxious and more likeable than those in the 'With' condition. The effect of condition on how enjoyable conversation partners rated the interaction was approaching significance (p = .077). There was a main effect of group across all the ratings, with conversation partners rating high socially anxious participants as looking more anxious, less likeable, and the conversation as less enjoyable. No other main effects or interaction effects were significant.

Table 3. Effects of experimental condition and social anxiety group on manipulation checks.

	Self-focus			Followed instructions		
Predictors	***b***	**CI**	***p*-value**	***b***	**CI**	***p*-value**
Intercept	-0.36	-0.62 – -0.10	0.007	-0.41	-0.79 – -0.02	0.037
Condition	1.35	1.00 – 1.70	<0.001	1.15	0.71 – 1.58	<0.001
Group	-0.60	-0.96 – -0.24	0.001	0.27	-0.19 – 0.73	0.248
Condition x Group	-0.08	-0.58 – 0.42	0.753	-1.40	-2.02 – -0.77	<0.001
Random Effects						
σ^2	0.47			0.72		
τ_{00}	$0.01_{PerceiverID}$			$0.11_{PerceiverID}$		
ICC	0.02			0.13		
N	$11_{PerceiverID}$			$11_{PerceiverID}$		
Observations	114			114		
Marginal R^2 / Conditional R^2	0.528 / 0.539			0.212 / 0.315		

CI = 95% confidence interval

Marginal R^2 = variance explained by random and fixed effects

Conditional R^2 = variance explained by fixed effects

Perceiver ID = Conversation partner ID

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Observer ratings. Table 6 presents findings from the linear mixed models for observer ratings. Conversations were rated more critically in the 'With' condition compared to the 'Without' condition. There was also a main effect of group on observer ratings, with high socially anxious adolescents receiving more critical ratings than low socially anxious adolescents. The interaction effect was statistically non-significant.

Discussion

The findings of this experimental study are consistent with the hypothesis that self-focused attention and safety behaviours are relevant to the maintenance of adolescent social anxiety.

Table 4. Linear mixed model results for self-report ratings.

	Felt anxious			Looked anxious			Belief			How well the conversation went		
Predictors	***B***	**CI**	***p*-value**	***b***	**CI**	***p*-value**	***b***	**CI**	***p*-value**	***b***	**CI**	***p*-value**
Intercept	-0.08	-0.35 – 0.18	0.527	0.17	-0.14 – 0.48	0.281	-0.25	-0.56 – 0.07	0.126	-0.02	-0.37 – 0.34	0.916
Condition	-0.92	-1.27 – -0.57	<0.001	-1.16	-1.53 – -0.80	<0.001	-0.49	-0.90 – -0.07	0.021	0.89	0.50 – 1.28	<0.001
Group	1.12	0.76 – 1.48	<0.001	0.73	0.35 – 1.11	<0.001	1.14	0.72 – 1.57	<0.001	-0.69	-1.10 – -0.28	0.001
Condition x Group	0.01	-0.48 – 0.51	0.956	0.28	-0.24 – 0.80	0.294	-0.34	-0.93 – 0.25	0.258	-0.37	-0.93 – 0.19	0.192
Random Effects												
σ^2	0.46			0.50			0.64			0.58		
τ_{00}	$0.02_{PerceiverID}$			$0.06_{PerceiverID}$			$0.03_{PerceiverID}$			$0.11_{PerceiverID}$		
ICC	0.03			0.11			0.04			0.16		
N	$11_{PerceiverID}$			$11_{PerceiverID}$			$11_{PerceiverID}$			$11_{PerceiverID}$		
Observations	114			114			114			114		
Marginal R^2 / Conditional R^2	0.528 / 0.543			0.451 / 0.512			0.346 / 0.373			0.324 / 0.434		

CI = 95% confidence interval

Marginal R^2 = variance explained by random and fixed effects

Conditional R^2 = variance explained by fixed effects

Perceiver ID = Conversation partner ID

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Table 5. Linear mixed model results for conversation partner ratings.

	Participant looked anxious			Enjoyed conversation			Liked participant		
Predictors	***b***	**CI**	***p*-value**	***b***	**CI**	***p*-value**	***b***	**CI**	***p*-value**
Intercept	-0.08	-0.44 – 0.27	0.648	0.04	-0.33 – 0.42	0.824	-0.07	-0.51 – 0.36	0.742
Condition	-0.55	-1.00 – -0.10	0.016	0.41	-0.04 – 0.86	0.077	0.43	0.01 – 0.85	0.043
Group	0.82	0.35 – 1.28	0.001	-0.78	-1.25 – -0.30	0.001	-0.56	-1.00 – -0.11	0.014
Condition x Group	-0.03	-0.67 – 0.61	0.922	0.21	-0.44 – 0.86	0.522	-0.04	-0.64 – 0.56	0.898
Random Effects									
σ^2	0.76			0.78			0.66		
τ_{00}	0.05 $_{PerceiverID}$			0.08 $_{PerceiverID}$			0.26 $_{PerceiverID}$		
ICC	0.06			0.09			0.28		
N	11 $_{PerceiverID}$			11 $_{PerceiverID}$			11 $_{PerceiverID}$		
Observations	114			114			114		
Marginal R^2 / Conditional R^2	0.230 / 0.280			0.176 / 0.250			0.122 / 0.367		

CI = 95% confidence interval

Marginal R^2 = variance explained by random and fixed effects

Conditional R^2 = variance explained by fixed effects

Perceiver ID = Conversation partner ID

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Participants felt more anxious and thought they looked more anxious in the 'With' compared to the 'Without' condition. They also thought they came across worse and that their negative predictions were more likely to have occurred. To a certain extent their fears were realised, in that the conversation partner and the independent observer rated them more critically, in terms of looking more anxious and being less likeable, when self-focused and using safety behaviours.

It is interesting to note that the detrimental effects of self-focus and safety behaviours were observed in both high and low anxiety groups. The finding indicates that focusing on oneself

Table 6. Linear mixed model results for observer ratings.

	Conversation questionnaire		
Predictors	***b***	**CI**	***p*-value**
Intercept	**-0.25**	**-0.64 – 0.14**	**0.211**
Condition	-0.58	-1.08 – -0.08	0.023
Group	1.14	0.64 – 1.65	<0.001
Condition x Group	-0.32	-1.01 – 0.36	0.357
Random Effects			
σ^2	0.60		
$\tau_{00\ PerceiverID}$	0.04		
ICC	0.06		
$N_{\ PerceiverID}$	8		
Observations	79		
Marginal R^2 / Conditional R^2	0.377 / 0.416		

CI = 95% confidence interval

Marginal R^2 = variance explained by random and fixed effects

Conditional R^2 = variance explained by fixed effects

Perceiver ID = Conversation partner ID

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and using safety behaviours in social situations is unhelpful for adolescents in general, whether or not they are socially anxious. However, when we compare ratings of safety behaviour use and self-focus in social situations day-to-day, significant group differences were observed. It therefore seems that whilst using safety behaviours and focusing internally is unhelpful for all adolescents, young people who are more socially anxious tend to use them more in everyday life, and so this will mean that the adverse effects will only manifest for this population. Extending from this observation is the question of why some individuals adopt these psychological processes more than others. Longitudinal studies examining the temporal associations between negative social beliefs and safety behaviours and self-focused attention could test the hypothesis put forward by cognitive accounts of social anxiety that it is negative social schema that motivate the use of safety behaviours and self-focus (e.g. [12]).

Our findings provide evidence for mechanisms of adolescent social anxiety: safety behaviours and self-focus. We cannot draw conclusions about the extent to which effects are driven by self-focused attention and/or the use of safety behaviours, because both processes were manipulated together. This is because in reality it is difficult to conceive of an individual using common safety behaviours such as monitoring how they are coming across and rehearsing what they are going to say *without* focusing on themselves. Whilst it is difficult to manipulate safety behaviours without manipulating self-focus, future studies that examine the effect of manipulating focus of attention only during a social interaction task would be useful. This limitation perhaps highlights the interconnectedness of the processes [35] emphasised in the dominant cognitive behavioural models of social anxiety in adults (e.g. [11, 12]). Support for the idea that the processes are reciprocally related also comes from this study (see also [36]). Participants were asked whether or not they had experienced an image or impression of how they came across during each conversation. Despite no instructions relating to mental imagery, almost half of all participants (49%) experienced a spontaneous negative image of how they looked when they were self-focused and using safety behaviours. One participant described an image of themselves as "*The weird kid sitting in the corner*", another as "*Sweating*, *blushing*, *uptight*, *spoilt*, *posh*". This compares to only 7% (4/59) in the 'Without' condition. The finding aligns with the suggestion that self-focus increases awareness of internally generated information such as negative images and impressions [37].

Participants were instructed to use a common set of safety behaviours, based on those used in the study of McManus et al [18]. However, according to cognitive accounts of social anxiety, safety behaviours are highly idiosyncratic to individuals and to their specific fears. As a result, we cannot conclude from our findings that the use of any safety behaviours is detrimental, but rather that the use of this particular set of safety behaviours is. However, the specific instructions that we used for the safety behaviour manipulation were based on safety behaviours that are particularly commonly reported by both socially anxious adults [18, 19, 38] and adolescents [10, 27, 39]. These safety behaviours are also strongly correlated with self-reported social anxiety in those samples when the correlations are based on naturalistic use [22, 23]. In addition to this limitation, we note that conversation partners were on average eight years older than participants, which may limit generalisability of our findings to an extent, and future studies with similar-aged peers as conversation partners would be useful. Furthermore, single item measures are prone to random measurement error and so future studies could include multi-item measures.

Although the sample was not drawn from a clinical population, the average score of high social anxiety participants' on a measure of social anxiety (LSAS-CA) was high (74.79 [28.44]) and the participant with the lowest LSAS-CA scored 29, which is above the suggested threshold (22.5) for distinguishing adolescents with social phobia and healthy controls [29]. Therefore, the findings of this study may well be pertinent to the task of developing therapeutic

techniques for adolescents with SAD. Cognitive Therapy for adult SAD [40], includes a *self-focused attention and safety behaviours experiment* similar to the one in this study in session 2 of the treatment. Therapists use it to help patients discover the unintended consequences of the processes. This demonstration is later followed by *attention retraining* to help patients reduce self-focus and become more externally focused in social situations; and *behavioural experiments* to help patients test out their predictions in feared situations whilst dropping their safety behaviours and focusing on other people and their reactions. Our results suggest that also incorporating the *self-focused attention and safety behaviours* experiment and linked procedures into CBT protocols for adolescent social anxiety may be beneficial. Consistent with this suggestion, two outcome studies that used versions of the adult Cognitive Therapy for SAD protocol with adolescents have shown promising results [41, 42].

This study indicates that the use of safety behaviours and self-focus in social situations is unhelpful. The processes are problematic in a number of ways, including increasing anxiety, maintaining negative self-perceptions, prompting negative mental imagery, and contaminating social performance. This is consistent with cognitive models of social anxiety in adults that suggest specific psychological processes (social cognitions, negative imagery, self-focused attention, and safety behaviours) create interlocking reciprocal links that lock individuals into a cycle of social anxiety. Our study suggests that similar processes may operate in adolescents and point to potential opportunities for intervention.

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Original Article

Establishing the Psychometric Properties of the Self-Report Liebowitz Social Anxiety Scale for Children and Adolescents in a General Population Adolescent Sample

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Abstract: The Liebowitz Social Anxiety Scale for Children and Adolescents (LSAS-CA) is a valid and reliable clinician-administered measure of social anxiety symptoms in young people. It has been adapted for self-report completion, and although the psychometric properties of this version of the scale have been examined in Spanish, Hebrew, and French language versions, this has not yet been done for the English language version. In the present study, we examined the factor structure and psychometric properties of the self-report version of the scale (LSAS-CA-SR) in a sample of UK adolescents recruited from schools. The factor structure of the scale was determined in our sample of $N = 829$; a four-factor structure, with interaction anxiety, interaction avoidance, performance anxiety, and performance-avoidance subscales, provided the best fit to the data. Measurement invariance of the scale was demonstrated across age and gender. Psychometric properties of the scale were sound, with good internal consistency (.88–.97), acceptable test-retest reliability (.45–.57), and evidence for convergent and divergent validity.

Keywords: social anxiety, adolescent, measurement, scale

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For individuals with a social anxiety disorder (SAD), the fear of humiliation and rejection renders many social and performance situations anxiety-provoking and motivates avoidance. It is a common condition (Kessler et al., 2005; Merikangas et al., 2010) that causes considerable impairment and distress, and persists for many years in the absence of treatment (Bruce et al., 2005). Importantly, epidemiological studies show that it generally starts in childhood or adolescence with new onsets being uncommon after early adulthood (Beesdo-Baum et al., 2012), and it is often preceded by subclinical levels of social anxiety symptoms (Rapee & Spence, 2004). Therefore, questionnaires that are valid, reliable, and easy to administer are essential for the early detection of elevated social anxiety symptoms and in order to guide prevention and treatment. The current study sought to examine the psychometric properties of the self-report version of a commonly used measure of social anxiety symptoms, the Liebowitz Social Anxiety Scale for Children and Adolescents (LSAS-CA; Masia-Warner et al., 1999) in a UK community sample of adolescents.

The Liebowitz Social Anxiety Scale (Liebowitz, 1987) is one of the most widely used measures of social anxiety in adults. The scale is comprised of 24 items covering a range of social (11 items) situations, for example, "Talking with people I don't know well" and performance (13 items) situations, for example, "Speaking up at a meeting." Each item is rated on two 4-point Likert scales, one assessing the anxiety the situation elicits and the other assessing avoidance. A total score can be generated (range: 0–144), or separate scores for anxiety and avoidance, and interaction and performance situations. Originally developed as a semi-structured interview, it was later adapted into a self-report version. Compared to the clinician-administered

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version, the self-report LSAS has the advantage of being quicker to complete as well as not requiring particular expertise or training for administration. Both the clinician-administered and self-report versions of the adult scale have good internal consistency and show convergent and divergent validity (Baker et al., 2002; Fresco et al., 2001; Heimberg et al., 1999). The self-report version of the LSAS has also been shown to be sensitive to change and show good test-retest reliability (Baker et al., 2002). Two-factor (fear and avoidance) and four-factor (social interaction, public speaking, observation by others, and eating and drinking in public) models have been proposed (Heimberg et al., 1999; Safren et al., 1999).

The semi-structured clinician-administered LSAS was adapted for children and adolescents by Masia-Warner and colleagues (1999; LSAS-CA). The scale is comparable to the adult version in terms of item number and scoring. Items were changed to better reflect the situations young people face, such as school settings. The final 24 items include 12 social interaction situations, for example, "Talking with other kids you don't know well," and 12 performance situations, such as "Asking questions in class." The authors of the scale undertook a psychometric investigation of the clinician-administered LSAS-CA and found that it showed good internal consistency and convergent and divergent validity (Masia-Warner et al., 2003). A four-factor structure of the scale was indicated in this preliminary investigation: interaction anxiety and interaction avoidance, performance anxiety, and performance avoidance. The scale was further examined by Storch and colleagues (2006) who also found evidence for good psychometric properties. However, in their study, the four-factor structure suggested by Masia-Warner et al. (2003) was found to be a poor fit. Instead, their exploratory factor analysis indicated a two-factor solution, social and school performance, with a higher-order factor for the performance and social subscales provided a better fit to the data.

Latterly, a self-report version of the LSAS-CA has been examined in Spanish-, French- and Hebrew-speaking youth (Olivares et al., 2009; Schmits et al., 2014; Shachar et al., 2014), with good psychometric properties, including internal consistency and convergent validity, found for all three versions. Factor structures across the three studies differed, however. In their community study of French-speaking adolescents, Schmits and colleagues (2014) found support for the four-factor solution proposed by Masia-Warner et al. (2003). In contrast, in exploratory factor analysis, Olivares and colleagues (2009) suggested that two factors, representing anxiety and avoidance subscales, provided a better fit to the data than four factors in a Spanish community sample. Shachar et al. (2014) also concluded a two-factor solution was best, however in their study with Israeli youth, the factors reflected social interaction and school performance.

It is noteworthy that neither the psychometric properties nor the factor structure of the English language version of the self-report LSAS-CA have been examined yet. The current study sought to bridge this gap. Our first aim was to determine the factor structure that exhibits the best fit in a UK secondary school sample (ages 11–18 years). This broadly corresponds to the World Health Organization (2020) definition of adolescence (ages 11–19 years) and that suggested by Jaworska and MacQueen (2015). We tested three structural models. Model 1 is made up of four factors: interaction anxiety, interaction avoidance, performance anxiety, and performance avoidance. This model was proposed by Masia-Warner et al. (2003) and further supported by the findings of Schmits et al. (2014). Model 2 is comprised of two factors, with interaction anxiety/avoidance and performance anxiety/avoidance (Storch et al., 2006). Model 3, comprised of two factors reflecting anxiety and avoidance, is reflective of the design of the questionnaire (with separate "anxiety" and "avoidance" rating scales) and was supported by the findings of Olivares et al. (2009). We then examined the measurement invariance of the optimal model across age and gender. Our second aim was to examine the psychometric properties of the self-report version of the scale. In particular, we examined internal consistency and test-retest reliability. We were also interested in convergent and divergent validity. In order to examine this, we included a measure of depression and broad anxiety symptoms, allowing a comparison of the associations between the LSAS-CA and social anxiety symptom subscale of the anxiety measure with other anxiety subscales and with the measure of depression.

Method

Design and Analysis Transparency

We report how all data exclusions, all data inclusion/exclusion criteria, whether inclusion/exclusion criteria were established prior to data analysis, all measures in the study, and all analyses including all tested models. If we use inferential tests, we report *p*-values, effect sizes, and 95% confidence intervals (CIs).

Participants and Procedures

Data from two linked studies were included. Participants from the first sample (Sample 1) were in UK school Years 7–9 (aged: 11–14 years), recruited from two non-selective and state-funded secondary schools in the UK. Participants completed a self-report questionnaire pack evaluating social anxiety, anxiety, and depression symptoms at time 1 (T1). At time 2 (T2), 4–6 months later, participants again

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completed the social anxiety measure to establish test-retest reliability. Participants from the second sample (Sample 2) were recruited from Years 12 and 13 (aged: 16–18 years) of a sixth form college in the UK. Participants completed a self-report questionnaire pack evaluating social anxiety, anxiety, and depression symptoms at time 1 (T1) only. For Sample 1, all students in years 7–9 in the two participating schools were invited to participate. Seven hundred eighteen students were invited to participate, and the consent rate was 87.2%. Thirteen percent of the pupils in Sample 1 were eligible for free school meals and for 13% English was not their first language. These figures were consistent with the schools as a whole and with national statistics (UK Statistics Authority, 2020). For Sample 2, information about the number of students invited and socioeconomic status was not collected.

None of the participants had difficulty reading or understanding English. Of the 863 participants who completed baseline questionnaires at T1, 34 were excluded as they had not completed all items of the LSAS-CA-SR, and so the final sample consisted of 829 participants (Sample 1: $n = 626$, average age: 12.95 [$SD = 0.88$], 52.5% female; and Sample 2: $n = 203$, average age: 17.12 [$SD = 0.72$], 59.30% female). There were no differences in the proportion of males and females in the younger age group (Sample 1) compared to the older age group (Sample 2) ($\chi^2(1) = 2.46$, $p > .05$). Four hundred seventy-one of participants from Sample 1 (75.24%) completed the LSAS-CA-SR at T2. The study procedures were in accordance with ethical standards and were approved by the Central University Research Ethics Committee at the University of Oxford (Reference number: R54283/RE001; Sample 1) and the Psychiatry, Nursing and Midwifery Research Ethics Subcommittee at King's College London (HR-18/19-8278; Sample 2). For participants under 16 years of age, written informed assent was obtained from all participants and opt-out consent was provided by participants' parents/guardians (Sample 1). For participants aged over 16 years of age, written informed consent was obtained from all participants (Sample 2).

Measures

The Liebowitz Social Anxiety Scale for Children and Adolescents-Self Report version (LSAS-CA; Masia-Warner et al., 2003) is a 24-item self-report scale measuring social anxiety symptoms in young people aged 7–18 years. This scale assesses levels of fear and avoidance in social (e.g., "Joining a conversation") and performance situations (e.g., "Answering a question in class"). Each item has a 0–3 rating represented by *none*, *mild*, *moderate*, and *severe*.

The Short Mood and Feelings Questionnaire (SMFQ; Angold et al. (1995)) is a 13-item self-report questionnaire assessing different aspects of depressive symptoms in children and adolescents, such as "I cried a lot". Each item ranges from 0 = *not true* to 2 = *true*. Total scores were obtained by summing up all the items. This scale has good reliability and validity (Angold et al., 1995; Turner et al., 2014). The internal consistency in this sample was $\alpha = .91$.

The child version of the Screen for Anxiety and Related Disorders (SCARED; Birmaher et al. (1997)) is a 41-item self-report questionnaire, with each item rated on a 3-point Likert scale. It is used to screen for childhood anxiety disorders including general anxiety disorder, separation anxiety disorder, panic disorder, social anxiety disorder, and school phobia in young people aged 8–18 years. The scale has good reliability and validity (Birmaher et al., 1997, 1999). The internal consistency of the total scale in this sample was $\alpha = .96$.

Data Analysis

Data was prepared in SPSS v. 26 and all analysis was conducted in R (R Core Team, 2019). There was no missing data for LSAS-CA-SR and age. Twelve participants (1.45%) did not indicate their gender. Missing data ranged from 9.52% to 13.15% for the SMFQ and SCARED subscales.

To test the structural models, confirmatory factor analysis (CFA) was undertaken. For all the models, we allowed the residual variances of each paired anxiety-avoidance item to be correlated, in line with Schmits et al. (2014). This is done when two variables share something in common not captured by the latent variables. All 24 social and performance situations covered by the LSAS-CA-SR are rated for both anxiety and avoidance. For example, participants rate how much anxiety "Talking to classmates or others on the telephone" (Item 1 of the scale) causes them *and* how much they avoid doing this. As a result, the measurement error of the anxiety items will be correlated with the measurement error of the avoidance items, and we, therefore, allowed 24 correlated errors. The diagonally weighted least squares method was used to take into account the ordinal nature of the data (Li, 2016) in the models. To test the goodness of fit of each model, we examined the Standardized Root Mean Square Residual (SRMR), the Root Mean Square Error of Approximation (RMSEA), the Comparative Fit Index (CFI), and the Tucker-Lewis Index (TLI). SRMR values below .08 and RMSEA values less than .06 indicate a good fit. CFI and TLI values greater than .90 suggest an acceptable fit and above .95 indicate a good fit. We also examined the Goodness of Fit Index (GFI), another absolute fit index, that is, equivalent to the R^2. The GFI ranges from 0 to 1 with higher scores indicating a better fit (values > .90 are acceptable; Hooper et al., 2008). Finally, χ^2 difference tests were used to compare our models.

Once an optimal model was identified, we then examined measurement invariance across gender and age, using

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a sequential constraint approach. The invariance of the factor structure was inspected in a series of nested models using multi-group CFA. First, we examined configural invariance, which tests whether the factor structure is equal across groups, but factor loadings, intercepts, and residual variances are allowed to differ (in other words, the basic model structure is invariant across groups). Second, metric invariance, whereby the factor structure and factor loadings are equal across groups, which means that the strengths of the associations between specific items and their respective underlying construct are the same across groups. The third, scalar invariance, whereby the loadings and intercepts are constrained to be equal across groups. This tests whether individuals who have the same score on the latent construct would obtain the same score on the observed variable regardless of their group membership. Change in two fit indices, the CFI and RMSEA, was used to compare the three invariance models (i.e., configural vs. metric, metric vs. scalar). The more restrictive model was considered as valid when $\Delta CFI \leq 0.01$ (Chen, 2007; Cheung & Rensvold, 2002; French & Finch, 2006) and $\Delta RMSEA \leq .015$ (Chen, 2007). This series of steps were undertaken to examine gender invariance (with gender as the grouping variable) and then repeated for age invariance (with age group: younger [11–14 years] and older [16–18 years] as the grouping variable).

To examine the internal consistency of the total score and also the subscales for the preferred model, we calculated Cronbach's α. Cronbach's α greater than .70 indicates acceptable consistency and above .80 good consistency (George & Mallery, 2016). Correlations between the LSAS total and SCARED subscales and the SMFQ were calculated and compared using the Fisher *r*-to-*z* transformation to examine convergent and divergent validity. To examine test-retest reliability, we calculated the intraclass coefficient (ICC) using the two-way mixed-effects model with an absolute agreement for a single measurement (Koo & Li, 2016). ICC values between .50 and .75 indicate moderate test-retest reliability, and above .75 indicate good reliability (Koo & Li, 2016). Finally, we examined gender differences in LSAS-CA-SR total and subscale scores.

Results

Structural Validity

Table 1 provides the goodness of fit indices for the three models. Model 1, made up of four factors, was found to be an acceptable to good fit to the data. Model 2, made up of two factors (social and performance) was an acceptable fit to the data, but it was a significantly poorer fit to the data than Model 1 ($\Delta\chi^2 = 218.97$, $\Delta df = 5$, $p < .001$). Model 3, made up of two factors (anxiety and avoidance), was also an acceptable fit to the data, but again, it was a significantly poorer fit to the data than Model 1 ($\Delta\chi^2 = 253.89$, $\Delta df = 5$, $p < .001$).

In sum, fit indices indicated Model 1 was a good fit for the data. While Model 2 and Model 3 were also acceptable, model comparison indicated Model 1 was a better fit. Therefore, for the following analysis, we examine the psychometric properties of the subscales based on structural Model 1 (interaction anxiety, interaction avoidance, performance anxiety, and performance-avoidance), and the total score.

Multi-Group Confirmatory Factor Analysis

Gender

The multi-group CFA displayed an adequate fit for the configural variance model: RMSEA = .049; CFI = .992; TLI = .992. The metric invariance model also showed an adequate fit according to goodness-of-fit indices (RMSEA = .053; CFI = .991; TLI = .990). The difference in CFI values between configural and metric invariance models was .001 and in RMSEA it was .004. The scalar invariance model also showed an acceptable fit (RMSEA = .051; CFI = .991; TLI = .992). The change in CFI from the metric invariance model was .001 and in RMSEA it was .003.

Age

The multi-group CFA displayed an adequate fit for the configural variance model: RMSEA = .046; CFI = .994; TLI = .994. The metric invariance model also showed an adequate fit according to goodness-of-fit indices (RMSEA = .052; CFI = .992; TLI = .992). The difference in CFI values between configural and metric invariance models was .002 and in RMSEA it was .006. The scalar invariance model also showed an acceptable fit (RMSEA = .047; CFI = .993; TLI = .993), and a minimal change in CFI and RMSEA values from the metric invariance model (ΔCFI = .001; ΔRMSEA = .005).

Internal Consistency

Cronbach's α values ranged from .88 to .97 for the LSAS-CA-SR total and subtotals (see Table 2), indicating that the total and all subtotals showed good internal consistency.

Correlations Among LSAS-CA-SR Total and Subtotals

Correlations between the LSAS-CA-SR total and subscales are presented in Table 3. All intercorrelations among

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Table 1. Fit indices for the three structural models tested (n = 614)

Model	Structure	Fit index[†]						
		χ^2	*df*	SRMR	RMSEA [95% CI]	CFI	TLI	GFI
1	4-factor: Interaction anxiety; Interaction avoidance; Performance anxiety; Performance avoidance	3,462.06	1,050	.052	.052 [.050, .054]	.968	.966	.991
2	2 -factor: Interaction; Performance	4,298.30	1,055	.062	.060 [.058, .062]	.957	.954	.987
3	2 -factor: Anxiety; Avoidance	4,128.15	1,055	.057	.058 [.056, .060]	.959	.957	.988

Note. *df* = Degrees of Freedom; SRMR = Standardized Root Mean Square Residual; RMSEA = Scaled Root Mean Square Error of Approximation; CFI = Scaled Comparative Fit Index; TLI = Scaled Tucker Lewis Index; GFI = Goodness of Fit Index. [†]Fit indices: for χ^2 a lower value indicates a better fit to the data; for the other fit indices, acceptable values are considered to be: SRMR < .08; RMSEA < .06; CFI > .90; TLI > .90; GFI > .90.

Table 2. Means and standard deviations and internal consistency and test-retest statistics for LSAS sub-scales

LSAS-CA-CR Subscale	Female (*SD*) (n = 443)	Male (*SD*) (n = 374)	Total sample (*SD*) (n = 829[‡])	*t*-test (*df*)	Cronbach α [95% CI]	ICC[°] [95% CI]
Total	51.86 (32.04)	34.76 (24.35)	44.10 (30.11)	$t(815) = 8.46^{**}$	.97 [.96, .97]	.54 [.48, .59]
Interaction anxiety	13.03 (8.98)	8.48 (7.07)	10.98 (8.51)	$t(829) = 8.00^{**}$	.92 [.91, .92]	.53 [.48, .59]
Interaction avoidance	12.83 (8.46)	9.95 (6.97)	11.52 (7.94)	$t(822) = 5.27^{**}$	.88 [.87, .89]	.45 [.39, .51]
Performance anxiety	13.29 (8.69)	7.63 (6.48)	10.72 (8.29)	$t(829) = 10.49^{**}$	.90 [.89, .91]	.57 [.51, .62]
Performance avoidance	12.53 (8.59)	8.77 (6.82)	10.83 (8.06)	$t(822) = 6.86^{**}$	.87 [.86, .88]	.50 [.44, .55]

Note. [‡]n = 12 participants did not indicate their gender; [°]n = 471 participants all from sample 1. *SD* = Standard Deviation; *df* = Degrees of Freedom; CI = Confidence Interval; ICC = Intraclass Correlation Coefficient. $^{**}p < .001$.

Table 3. Bivariate correlations of LSAS-CA-SR total and subscale scores, SMFQ, and SCARED subtotals

	LSAS Total	Interaction Anxiety	Interaction Avoidance	Performance Anxiety	Performance Avoidance	Panic	Social	General	Separation	School	SMFQ
LSAS Total	1	0.93**	0.91**	0.93**	0.91**	0.64**	0.73**	0.69**	0.46**	0.57**	0.61**
Interaction Anxiety		1	0.83**	0.85**	0.71**	0.66**	0.76**	0.70***	0.46**	0.55**	0.60**
Interaction Avoidance			1	0.71**	0.79**	0.54**	0.69**	0.60**	0.42**	0.48**	0.51**
Performance Anxiety				1	0.83**	0.62**	0.68**	0.68**	0.42**	0.56**	0.60**
Performance Avoidance					1	0.51***	0.57**	0.55**	0.39**	0.50**	0.52**
Panic						1	0.65**	0.76**	0.60**	0.72**	0.74**
Social							1	0.73**	0.48**	0.55**	0.57***
General								1	0.55**	0.64**	0.77**
Separation									1	0.61**	0.49**
School										1	0.67**
SMFQ											1

Note. LSAS Total = LSAS-CA-SR Total score; Interaction Anxiety = LSAS-CA-SR Interaction Anxiety subscale score; Interaction Avoidance = LSAS-CA-SR Interaction Avoidance subscale score; Performance Anxiety = LSAS-CA-SR Performance Anxiety subscale score; Performance Avoidance = LSAS-CA-SR Performance Avoidance subscale score; Panic = Panic subscale of the SCARED; Social = Social anxiety subscale of the SCARED; General = Generalised anxiety subscale of the SCARED; Separation = Separation anxiety subscale of the SCARED; School = School avoidance subscale of the SCARED; SMFQ = Short Mood and Feelings Questionnaire. $^{**}p < .001$.

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subscale scores were large in magnitude (≥ .71), as were those between the total and subscale scores (≥ .91).

Convergent and Divergent Validity

Bivariate correlations between the LSAS-CA-SR total and subscale scores, SMFQ total, and the subtotals of the SCARED questionnaire are presented in Table 3. The LSAS-CA-SR total and subscale scores showed significant positive correlations with all subscales of the SCARED and the SMFQ, as would be expected. However, they were highest with the social anxiety subscale. We examined this statistically with Fisher's r-to-z transformation, which allows two correlations to be compared. The correlation between the LSAS-CA-SR total and the social anxiety subscale of the SCARED was compared with the correlation between the LSAS-CA-SR total and each other subscale of the SCARED and the SMFQ. Consistent with what we would expect, the correlation between the LSAS-CA-SR total and the social anxiety subscale of the SCARED was

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significantly larger compared to that between the LSAS-CA-SR total and each of the other subscales of the SCARED and the SMFQ (all $p < .01$).

Test-Retest Reliability

Test-retest reliability was conducted on the younger sample only (for whom data from two-time points was available). The total LSAS-CA-SR demonstrated moderate but acceptable test-retest reliability, as shown in Table 2. We also computed the test-retest reliability for each of the four subscales. This was acceptable for the interaction anxiety, Performance anxiety, and performance-avoidance subscales, but lower for the interaction avoidance subscale.

Gender Differences

Table 2 presents the means and standard deviations for the total and subscale scores of the LSAS-CA-SR, for the group as a whole and split by gender. Independent *t*-tests revealed that girls scored significantly higher than boys on all measures ($p < .05$).

Discussion

Our study examined the psychometric properties of the self-report English language version of the LSAS-CA, a widely used measure of social anxiety in young people. It provides preliminary support for the reliability and validity of the scale in a sample of UK adolescents.

We tested three potential models of the factor structure of the scale; that suggested by Masia-Warner and colleagues (2003), by Storch et al. (2006), and the model reflective of the design of the questionnaire. According to the fit indices, all three models were acceptable. However, fit indices were marginally better for the four-factor model suggested by Masia-Warner and colleagues, with interaction/performance and anxiety/avoidance components. Furthermore, model comparison also indicated that this model provided the best fit to the data.

We also examined the correlations among the subscale scores and correlations between subscale scores and external measures for further evidence for the utility of distinguishing the subscales. As one would expect, the associations among the subscales were all highly significant, and although they were higher than those reported with the self-report version in a general adolescent sample by Schmits et al. (2014; range: .43–.70), they were moderate to large in magnitude and lower than the intercorrelations reported by Masia-Warner et al (2003) using the clinician-administered version in their sample of youth with SAD, other anxiety disorders, and healthy controls (range of *r*: .78–.97). On examination of the associations between subscale scores and other measures, we observed similar findings to Masia-Warner and colleagues (2003), with regard to associations of the subscales with other social anxiety measures. They reported larger associations between the Social Phobia Anxiety Inventory and the interaction subscales of the LSAS-CA compared to the performance subscales. We found a similar pattern of associations with the social anxiety subscale of the SCARED in our study. With regards to correlations with other measures, we observed somewhat stronger correlations between the LSAS anxiety subscales and subscales of the SCARED and the SMFQ compared to the avoidance subscales.

Taken together, the findings from the CFA suggest that the most valid approach to interpreting the LSAS-CA-SR is by inspecting subscales reflecting: interaction anxiety, interaction avoidance, performance anxiety, and performance avoidance. However, given the acceptability of all models, and the ease of calculating total scores and total anxiety/avoidance subscales, this would also be a useful and valid approach to scoring. Interestingly, our findings closely align with those of Schmits and colleagues (2014). In their study of the French language self-report version of the scale, the authors concluded that the four-factor structure as suggested by Masia-Warner et al. (2003) was the optimal fit, but, as we found here, the two-factor solutions were also acceptable.

We then examined measurement invariance of the scale across an age group (young adolescents aged 11–14 years and older adolescents aged 16–18 years) and gender. Measurement invariance is an estimate of the extent to which respondents from different groups interpret the same measure in a conceptually similar way. Multigroup CFA indicated that the optimal factor structure we identified in the CFA fitted both age groups and both genders well. Also, factor loadings and item intercepts appeared comparable across both ages and genders. These findings suggest that both young and old adolescents and boys and girls similarly understand the measure, and that the questionnaire can be compared across groups, with observed differences reflecting differences in the underlying constructs rather than measurement discrepancies. We note that stricter cut-offs have been proposed for comparing CFI between models to examine measurement invariance, for example, Meade et al. (2008) recommended a threshold of .002. However, others have argued this threshold is too conservative in real-world settings (Little, 2013), and we, therefore, decided to adopt the more widely used threshold of .01 (Chen, 2007; Cheung & Rensvold, 2002; French & Finch, 2006).

Psychometric properties of the scale were examined. Convergent and divergent validity was supported, with stronger correlations between the LSAS-CA-SR total and the social anxiety subscale of the SCARED than with the

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other subscales and the SMFQ. This is in line with previous studies that have examined the clinician-reported version of the scale Masia-Warner et al., 2003; Storch et al., 2006) and the self-report version in Spanish (Olivares et al., 2009), French (Schmits et al., 2014), and Hebrew (Shachar et al., 2014). It, therefore, seems that, within this general population sample, the scale appears to be measuring a construct more similar to social anxiety, than to other forms of anxiety or depression. We note that the association between the scale and the generalized anxiety disorder subscale of the SCARED is large in magnitude, which is not surprising given the high comorbidity of the two types of anxiety. However, the correlation was still significantly lower than it was with the social anxiety subscale (0.70 vs. 0.74). The internal consistency was good, suggesting that the items within the scale and subscales (based on the optimal model) measure aspects of the same construct. The present findings add to the body of evidence suggesting that the items within the scale and its subscales measure aspects of the same construct (Masia-Warner et al., 2003; Olivares et al., 2009; Schmits et al., 2014; Storch et al., 2006).

Test re-test reliability was investigated in a subset of the sample for whom we had available data. To our knowledge, this is the first time the test-retest reliability of the LSAS-CA-SR has been examined in any language. While moderate test re-test reliability was found for the total and three out of four subscales, one of the subscales, interaction avoidance, showed poor test-retest reliability. It may therefore be most appropriate to inspect total scores rather than subscales over time. Finally, and as expected, gender differences were observed across the total and all subscale scores, with females endorsing higher scores. This is consistent with previous research (Asher & Aderka, 2018; MacKenzie & Fowler, 2013).

The study has limitations. The sample was a general population sample. While this is perhaps ideal for establishing core psychometric properties, especially convergent and divergent validity, one would wish to know whether a similar factorial structure and other psychometric properties are applied within a population that is restricted to clinical cases. Furthermore, future studies could examine the sensitivity to change of the scale and its discriminant validity. Only self-report measures were used. Greater confidence about the validity of the scale could be provided by establishing the patterns of association with measures reported by others, such as teachers/parents. The scale was developed for children and adolescents, but our study was limited to an adolescent sample. Replication of the findings with a pre-adolescent sample would be valuable to inform the use of the scale with this population. Due to the lack of data about consent rate and socioeconomic status for Sample 2 we cannot be certain that there are no differences between the samples on these dimensions.

The study establishes the optimal factor structure, measurement invariance, and psychometric properties of the English-language self-report version of the LSAS-CA in a sample of UK adolescents. For clinicians and researchers, the LSAS-CA-SR is a useful tool, because it is quick to complete, reliable, and valid.

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ORIGINAL ARTICLE

Development and Preliminary Validation of the Child & Adolescent Social Cognitions Questionnaire

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Abstract
Negative cognitions play a central role in adolescent social anxiety, and yet there is a lack of empirically validated measures assessing these in detail. This study describes the adaptation of the Child & Adolescent Social Cognitions Questionnaire (CASCQ) from the adult version of the scale and its preliminary validation in a general adolescent school sample (N = 671). Exploratory and confirmatory factor analysis on split halves of the data indicated two factors, labelled 'negative self-concept' and 'anxious appearance', provided the best fit. Totals and subscales possessed good internal consistency and convergent validity. Findings suggest that the CASCQ is a reliable and valid measure of social anxiety-related cognitions in youth and may be useful for research and clinical purposes. Further examination of the scale with pre-adolescents and clinical samples is warranted.

Keywords Social anxiety · Youth · Social anxiety-related cognition · Scale

Introduction

The question of why some individuals continue to feel anxiety in social and performance situations, even in the absence of negative feedback, is critical for understanding the maintenance of social anxiety disorder (SAD) and for efforts to effectively intervene. Cognitive behavioural models suggest that negative thoughts about oneself and others' reactions in social situations, such as "*people will see that I am nervous*", "*I will blush*", and "*I am boring*", play a central role in the disorder [1–4].

In adults, various scales for assessing such thoughts have been developed, including the Social Cognitions Questionnaire (SCQ) [5]. The SCQ was developed in order to quantify social anxiety-related cognitions [6]. It is comprised of 22 items, each reflecting a common social anxiety-related cognition (e.g. "*People will stare at me*"). Items are rated on two dimensions: how frequently the thought occurs in social situations, and how strongly the thought is believed. In adults, the scale has been shown to have good internal consistency [7] and test–retest reliability [8]. A three or four factor structure was indicated in preliminary work of Clark [7], with items loading onto the first factor clustering around the concept of negative self-concept (e.g. "*I am unlikeable*"), and the second and third factors reflecting concerns about the appearance of anxiety (e.g. "*I will be unable to speak*" in factor 2 and "*I am going red*" in factor 3). The fourth factor, reflecting inferiority, accounted for a relatively small amount of variance and had only two strong item loadings. Finally, treatment studies have shown large reductions in frequency and belief ratings on the SCQ over treatment [9, 10], indicating that the scale is sensitive to change.

SAD usually begins in childhood or adolescence, with a median age of onset of 13 years [11], and therefore there is theoretical and practical importance to understanding its persistence in youth. Recent research indicates that in young people as in adults, negative social anxiety-related cognitions are associated with social anxiety and appear to be relevant to development and maintenance [12–14]. Furthermore, two treatment studies of Cognitive Therapy for adolescent SAD, a treatment designed specifically to target negative social anxiety-related cognitions and beliefs, found significant reductions in the strength of these by the end of treatment [15, 16], consistent with cognitive behavioural accounts of the disorder.

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Surprisingly, only two measures of social-evaluative cognition have been evaluated for use with young people. The Child Automatic Thoughts Questionnaire [17, 18] was designed to measure a range of negative thoughts across anxiety domains, and includes 10 items relating to social threat, for example "*other kids are making fun of me*". The scale has been shown to be reliable and valid, however as pointed out by Wong and colleagues [19], the scale measures 'in the moment' negative automatic thoughts but it does not assess broader social-evaluative beliefs. The Report of Youth Social Cognitions is a 14-item measure that was developed recently to examine social-evaluative beliefs in youth [19], including items such as "*other kids think I'm silly*". Whilst the scale was shown to have good psychometric properties [19], it does not include items capturing the particular ways socially anxious youth fear they will behave in social situations (e.g. "*I will go red*", "*I will stumble over my words*"). These cognitions are a central feature of cognitive behavioural models of social anxiety [14] and a target for therapies based on these models. In adults, the SCQ measures these cognitions, as well as broader social-evaluative beliefs such as "*I am boring*", and we think it would be a useful tool to adapt for youth. In particular, it could improve our theoretical understanding of youth social anxiety and aid the delivery of psychological prevention and treatment approaches for SAD in young people.

With this study, we aimed to adapt the SCQ for young people and provide a preliminary examination of its psychometric properties in a school-based sample of UK adolescents. The first aim of the study was to examine the factor structure of the scale. The second aim was to determine preliminary psychometric properties of the scale, in particular internal consistency and construct validity. Construct validity was assessed by examining the associations between the adapted SCQ and scores on a measure of social anxiety, with and without controlling for depression and for generalised anxiety disorder (GAD) symptoms, both of which are strongly associated with social anxiety symptoms [20]. The third aim was to explore and compare scores on the adapted SCQ for older and younger adolescents and for males and females. This is because social anxiety symptoms are known to increase with age during adolescence [21] and to be higher amongst females than males [22] and so we were interested to observe whether scores on the adapted SCQ showed similar gender- and age-related differences.

Method

Participants

In total, 671 adolescents aged 11–18 years completed all items of the adapted SCQ as part of their participation in school-based studies of social anxiety in youth. Sample 1 comprised 482 young people in UK school years 7–9 recruited from two non-selective and state-funded secondary schools (aged 11–14 years, mean age = 12.98, SD = 0.87, 248 [51.45%] female). Sample 2 comprised 189 young people in years 12 and 13 attending a sixth form college in the UK (aged 16–18 years, mean age = 17.11, SD = 0.72, 109 [57.67%] female).

Procedures

The study procedures were in accordance with ethical standards and were approved by the Central University Research Ethics Committee at the University of Oxford (Reference number: R54283/RE001for Sample 1) and the Psychiatry, Nursing and Midwifery Research Ethics Subcommittee at King's College London (HR-18/19-8278; Sample 2). For participants under 16 years of age, written informed assent was obtained from all participants and opt-out consent was provided by participants' parents/guardians. For participants over the age of 16 years, written informed consent was obtained from young people.

Before data collection, the research team explained the study to students during tutor time and information packs were distributed to caregivers and students. All students able to read and write English were encouraged to participate. Data collection took place during school time at least 2 weeks after information about the project had been disseminated. Participants completed a self-report questionnaire pack, including the Social Cognitions Questionnaire adapted for children and adolescents (details below) and measures evaluating social anxiety, anxiety and depression symptoms. For Sample 1, all students in years 7–9 in the two participating schools were invited to participate. 718 students were invited to participate, and the consent rate was 87.2%. For Sample 2, information about the number of students invited was not collected. Of the total 865 participants who participated (n = 657 from Sample 1 and n = 208 from Sample 2), 671 had completed all items of the CASCQ. Those who had completed all items of the CASCQ were more likely to have been from Sample 2 (and therefore older) than Sample 1, compared to those who did not complete all items, but there no differences in gender, social anxiety symptoms, or depression symptoms.

Measures

Child & Adolescent Social Cognitions Questionnaire (CASCQ) is a self-report questionnaire, with each item corresponding to a common social anxiety-related cognition. All 22 items from the adult Social Cognitions Questionnaire [5] were included in the youth version, with wording adapted to be suitable for children and adolescents. In consultation

with experts in the field (CC and PW), six additional items were added which were considered to be relevant to young people, for example, "*People will be angry with me*". A sample of five young people who had recovered from SAD after treatment reviewed the items (original and revised, and the additional items) and rated each one from 0 to 5 on how understandable they were. Revisions improved ratings of all items. The pool of 28 items were all rated 4/5 or 5/5. Respondents are asked to rate how frequently they experience the thought when they are socially anxious, from 1 (never) to 5 (every time), and how much they believe the thought when it occurs, from 0 (not at all) to 100 (totally). Two scores are generated: a mean frequency score and mean belief score. The final 27 item scale is freely available at https://oxcadatresources.com.

The Liebowitz Social Anxiety Scale for Children and Adolescents-Self Report version (LSAS-CA-SR; [23]) is a 24-item self-report scale measuring social anxiety in young people aged 7–18 years old. This scale assesses levels of both fear and avoidance in social and performance situations. Each item has a 0–3 rating represented by 'none', 'mild', 'moderate' and 'severe'. The total score ranges from 0 to 144. The scale has acceptable reliability and validity [23]. The internal consistency in the current sample was $\alpha = 0.97$.

The Short Mood and Feelings Questionnaire (SMFQ; [24]) is a 13-item self-report questionnaire designed to assess different aspects of depressive symptoms in young people aged 6–17 years. Each item ranges from 0 (not true) to 2 (true). Total scores were obtained by summing up all the items. This scale has acceptable reliability and validity [25]. The internal consistency in this sample was $\alpha = 0.91$.

The child version of the *Screen for Anxiety and Related Disorders* (SCARED; [26]) is a 41-item self-report questionnaire used to screen for childhood anxiety disorders including general anxiety disorder, separation anxiety disorder, panic disorder, social anxiety disorder, and school phobia. The GAD subscale was used to examine validity in the present study. The scale has good reliability and validity [26, 27]. Internal consistency of the total scale in this sample was $\alpha = 0.96$.

Data Analysis

Data was prepared in SPSS v. 26 and analysis was conducted in R [28] using the lavaan package [29]. Mean substitution was performed when less than 10% of items were missing in the LSAS-CA-SR, SCARED and SMFQ questionnaires [30]. At variable level, missing data was low, ranging from 1.19 to 4.32% (LSAS-CA-SR was missing for n = 8 participants, SCARED for n = 29, and SMFQ for n = 20). Little's MCAR test indicating that data was missing completely at random at variable level ($p > 0.05$). For analysis that involved the LSAS-CA-SR, SMFQ and SCARED (i.e. examination of validity), pairwise deletion was used for data missing at variable level.

The factor structure of the CASCQ was examined using a combination of Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) in the general adolescent sample. The sample was split in two randomly (0.6/0.4 ratio). EFA was conducted in the first half of the dataset and then this factor structure was confirmed in the second half using CFA.

The factor structure was examined separately for belief and frequency ratings. The frequency scale generates ordinal data, and so the Ordinary Least Squared method of extraction was used. For the belief scale, the Kolmogorov–Smirnov test showed that the data was normally distributed and so the maximum likelihood method of extraction was used. For both EFA an oblique rotation was used (Oblimin), because we expected the factors to be correlated with each other. To determine the appropriate number of factors to retain we used parallel analysis (for non-normal data in the case of frequency ratings, and normal data in the case of belief ratings) and we examined the scree plot and interpretability of the generated factors. In addition, we examined item loadings, and in line with Guadagnoli and Velicer [31], considered factors on which four or more items had loadings of at least 0.6 as reliable. In terms of evaluating item loadings onto factors, we were guided by Stevens [32], who suggested using a cut-off of 0.4. To test the goodness of fit of the models in the CFA, we examined the Standardized Root Mean Square Residual (SRMR), the Root Mean Square Error of Approximation (RMSEA), the Comparative Fit Index (CFI) and the Tucker Lewis Index (TLI). SRMR values below 0.08 and RMSEA values less than 0.06 indicate a good fit. CFI and TLI values of 0.90 or greater suggest an acceptable fit [33, 34].

The rest of the analysis was undertaken with the whole sample. First, mean scores were calculated for the total score and for the subscales derived from the indicated factor structure. Then, internal consistency of the total score and subscales was assessed with Cronbach's alpha, with alpha greater than 0.70 indicating acceptable consistency and above 0.80 good consistency [35]. To examine construct validity, correlations between the CASCQ totals and subtotals and the LSAS-CA-SR were examined, before carrying out partial correlations between the CASCQ totals and subtotals and the LSAS-CA-SR, controlling for GAD symptoms (from the SCARED) and then for depression symptoms (SMFQ). Finally, we examined age and gender differences in CASCQ-F and CASCQ-B total and subtotal mean scores.

Results

Exploratory Factor Analysis: Belief Ratings

The Kaiser–Meyer–Olkin measure of sampling adequacy (KMO = 0.98) and Bartlett's test of sphericity ($\chi^2(378) = 17853.36$, $p < 0.001$) indicated that the data was suitable for factor analysis. Parallel analysis and examination of the scree plot (Fig. 1; left hand plot) suggested that two factors were appropriate for extraction.

The two-factor solution explained 65% of the variance, with the first factor explaining 39% and the second explaining 26%. Standardized factor loadings are shown in Table 1. Fifteen items loaded onto Factor 1, 13 of these had a loading of ≥ 0.60. Thirteen items loaded onto Factor 2. Seven of these had a loading of ≥ 0.60. The two factors were correlated ($r = 0.76$), which supports the idea that the two factors reflect related but not identical concepts. Factor 1 reflects 'negative self-concept' whilst Factor 2 represents 'anxious appearance'.

Exploratory Factor Analysis: Frequency Ratings

The Kaiser–Meyer–Olkin measure of sampling adequacy (KMO = 0.97) and Bartlett's test of sphericity ($\chi^2(378) = 13{,}989.21$, $p < 0.001$) indicated that the data was suitable for factor analysis. Parallel analysis suggested that three factors were appropriate for extraction, examination of the scree plot (Fig. 1; right hand plot) indicated that between two and three factors were appropriate, and on examination of the factor loadings and interpretability, a two factor solution was decided upon.

The two factor solution explained 56% of the variance, with the first factor explaining 35% and the second explaining 21%. Standardized factor loadings are shown in Table 2. Sixteen items loaded onto Factor 1, twelve with a loading of ≥ 0.60. Twelve items loaded onto Factor 2. Six of these had a loading of ≥ 0.60. The two factors were correlated ($r = 0.76$), which supports the idea that the two factors reflect related but not identical concepts. Factor 1 reflects 'negative self-concept' whilst Factor 2 represents 'anxious appearance'.

Confirmatory Factor Analysis

Based on the EFA, item 25 ("*I will get picked on and teased*") was dropped from the scale before the CFA, due to instability of loading. This is because the item loaded onto Factor 2 for Belief ratings (loading for Factor 1: 0.38; loading for Factor 2: 0.44), but onto Factor 1 for Frequency ratings (loading for Factor 1: 0.53; loading for Factor 2: 0.14). Loadings from the CFA are shown in Table 3; loadings of all items for the Belief model and the Frequency model were 0.60 or above.

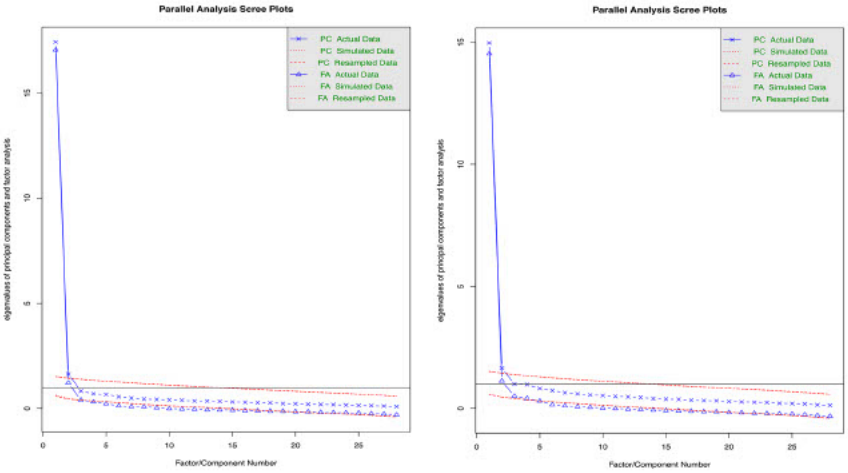


Fig. 1 Scree plots of indicated factors to extract for CASCQ Belief data (left hand plot) and CASCQ Frequency data (right hand plot)

Table 1 Pattern matrix showing the belief item loadings with a two-factor solution

		Factor 1	Factor 2
1	I will be unable to speak	−0.03	**0.79**
2	I am unlikeable	**0.84**	0.01
3	I am going to tremble or shake uncontrollably	−0.04	**0.85**
4	People will stare at me	**0.51**	0.31
5	I am being an idiot	**0.75**	0.08
6	People won't want to be friends with me	**0.84**	0.04
7	I will be frozen with fear	−0.09	**0.93**
8	I will drop or spill things	0.17	**0.61**
9	I am going to be sick	0.07	**0.69**
10	I am not good enough	**0.92**	−0.08
11	I will babble or talk funny	0.31	**0.49**
12	I am not as good as others	**0.97**	−0.12
13	I will be unable to concentrate	0.32	**0.45**
14	I will be unable to write properly	0.07	**0.73**
15	People are not interested in me	**0.95**	−0.08
16	People won't like me	**0.96**	−0.06
17	People will make fun of me	**0.79**	0.1
18	I will sweat/perspire	−0.02	**0.74**
19	I am going red	0.10	**0.55**
20	I am weird/different	**0.72**	0.07
21	People will see I am nervous	0.21	**0.54**
22	People think I am boring	**0.63**	0.2
23	I will embarrass myself*	**0.75**	0.11
24	People will be angry with me*	**0.55**	0.3
25	I will get picked on and teased*	0.38	**0.44**
26	I will look stupid*	**0.76**	0.13
27	I will be forced to do things I don't want to do*	0.22	**0.58**
28	People will laugh at me*	**0.73**	0.12

Item loadings greater than 0.4 are indicated in bold

*Asterisked items are those items added to the original Social Cognitions Questionnaire when adapting the scale for children and young people

Table 2 Pattern matrix showing the Frequency item loadings with a two-factor solution

		Factor 1	Factor 2
1	I will be unable to speak	0.11	**0.56**
2	I am unlikeable	**0.92**	−0.09
3	I am going to tremble or shake uncontrollably	−0.08	**0.79**
4	People will stare at me	**0.44**	0.34
5	I am being an idiot	**0.73**	0.07
6	People won't want to be friends with me	**0.87**	−0.04
7	I will be frozen with fear	−0.01	**0.74**
8	I will drop or spill things	0.11	**0.51**
9	I am going to be sick	0.01	**0.63**
10	I am not good enough	**0.76**	0.08
11	I will babble or talk funny	0.26	**0.47**
12	I am not as good as others	**0.74**	0.08
13	I will be unable to concentrate	0.12	**0.55**
14	I will be unable to write properly	−0.06	**0.67**
15	People are not interested in me	**0.89**	−0.05
16	People won't like me	**0.99**	−0.16
17	People will make fun of me	**0.76**	0.1
18	I will sweat/perspire	0.04	**0.65**
19	I am going red	0.16	**0.46**
20	I am weird/different	**0.56**	0.22
21	People will see I am nervous	0.17	**0.62**
22	People think I am boring	**0.62**	0.13
23	I will embarrass myself	**0.62**	0.24
24	People will be angry with me	**0.47**	0.27
25	I will get picked on and teased	**0.53**	0.14
26	I will look stupid	**0.69**	0.14
27	I will be forced to do things I don't want to do	0.19	**0.55**
28	People will laugh at me	**0.65**	0.15

Item loadings greater than 0.4 are indicated in bold

For the Belief ratings, SRMR (0.05), CFI (0.90) and TLI (0.90) were acceptable, but RMSEA was above the recommended threshold (RMSEA = 0.09 (95% confidence interval [CI]: 0.086, 0.098)). The fit of the model for the Frequency ratings was better, with all indices in the acceptable range. SRMR was 0.05, RMSEA was 0.05 (95% CI: 0.042–0.057), and CFI and TLI were both above 0.90 (CFI = 0.998 and TLI = 0.998).

Internal Consistency

As can be seen in Table 4, internal consistency for the total scores and subscales was good for all frequency and belief scales, ranging from 0.90 to 0.98.

Convergent Validity

Convergent validity of the CASCQ was inspected by examining the association between the total and subtotals (for both frequency and belief scales) with self-report measures of social anxiety (LSAS-CA-SR). As expected, and shown in Table 5, each subscale and the totals for both frequency and belief ratings were significantly and positively correlated with the LSAS-CA-SR total ($rs > 0.45$). To rule out the possibility that the association between the CASCQ and social anxiety symptoms is largely due to comorbid GAD or depression symptoms, the correlations between the CASCQ subtotals and totals and LSAS-CA-SR total were repeated first controlling for depression symptoms (Belief Total: *partial* r = 0.336, $p < 0.01$; Frequency Total: *partial* r = 0.580; $p < 0.01$), and second controlling for GAD symptoms (Belief Total: *partial* r = 0.300, $p < 0.01$; Frequency Total: *partial*

Table 3 Item loadings from the CFA for the belief and frequency ratings

	Belief	Frequency
Negative self-concept factor		
I am unlikeable	0.86	0.89
People will stare at me	0.75	0.78
I am being an idiot	0.81	0.82
People won't want to be friends with me	0.87	0.86
I am not good enough	0.89	0.85
I am not as good as others	0.87	0.89
People are not interested in me	0.87	0.91
People won't like me	0.90	0.94
People will make fun of me	0.88	0.86
I am weird/different	0.73	0.77
People think I am boring	0.83	0.82
I will embarrass myself	0.88	0.86
People will be angry with me	0.79	0.78
I will look stupid	0.85	0.90
People will laugh at me	0.81	0.86
Anxious appearance factor		
I will be unable to speak	0.78	0.74
I am going to tremble or shake uncontrollably	0.75	0.75
I will be frozen with fear	0.79	0.74
I will drop or spill things	0.69	0.66
I am going to be sick	0.72	0.65
I will babble or talk funny	0.71	0.79
I will be unable to concentrate	0.72	0.77
I will be unable to write properly	0.71	0.71
I will sweat/perspire	0.77	0.71
I am going red	0.70	0.60
People will see I am nervous	0.81	0.82
I will be forced to do things I don't want to do	0.79	0.83

Table 5 Correlations between CASCQ totals and subtotals and social anxiety symptom measure

	CASCQ-B	CASQ-B-N	CASQ-B-A	CASCQ-F	CASQ-F-N	CASQ-F-A
LSAS-CA-SR	**0.56****	**0.59****	**0.45****	**0.76****	**0.74****	**0.70****
CASCQ-B		0.97**	0.94**	0.71**	0.68**	0.66**
CASQ-B-N			0.83**	0.74**	0.76**	0.63**
CASQ-B-A				0.57**	0.50**	0.63**
CASCQ-F					0.97**	0.92**
CASQ-F-N						0.81**

LSAS-CA-SR Leibowitz Social Anxiety Scale for Children and Adolescents Self-Report Version, *CASCQ-B* Child and Adolescent Social Cognitions Questionnaire Total Belief, *CASCQ-B-N* Child and Adolescent Social Cognitions Questionnaire Negative Self-Concept Belief, *CASCQ-B-A* Child and Adolescent Social Cognitions Questionnaire Anxious Appearance Belief, *CASCQ-F* Child and Adolescent Social Cognitions Questionnaire Total Frequency, *CASCQ-F-N* Child and Adolescent Social Cognitions Questionnaire Negative Self-Concept Frequency, *CASCQ-F-A* Child and Adolescent Social Cognitions Questionnaire Anxious Appearance Frequency

*Indicates $p < 0.01$; **Indicates $p < 0.001$;

Correlations between the LSAS-CA-SR and CASCQ totals and subscales are shown in bold

r = 0.486; $p < 0.01$). Correlations with Belief and Frequency subscale scores also remained significant when controlling for depression symptoms and for GAD symptoms ($p < 0.01$).

Age and Gender Analysis

As can be seen in Table 4, in the general adolescent samples, girls scored more highly than boys and the older adolescents scored more highly than the younger adolescents on all totals and subtotals of the CASCQ. The same pattern of results is reflected in the LSAS-CA-SR scores, with higher LSAS-CA-SR scores in girls ($p < 0.001$) and older adolescents ($p < 0.001$).

Discussion

This study provides a preliminary psychometric analysis of the Social Cognitions Questionnaire [6], adapted for children and adolescents (CASCQ). We found support for the reliability and validity of the scale in a general sample of UK adolescents.

We were initially interested in examining the factor structure of the scale. We undertook EFA in a random half of the sample and identified a two-factor solution for both belief and frequency ratings. Item loadings were strong and broadly consistent across the two scoring forms. The factor structure was then supported in a CFA undertaken in the second half of the sample. The fit was acceptable for the frequency ratings. Whilst certain fit indices were more marginally acceptable for the belief ratings, we note that all item loadings remained high. Inspecting the item loadings, we interpreted one factor as 'negative self-concept' and the other as 'anxious appearance'. Example items loading on the 'negative self-concept' factor include "*people will think I am boring*" and "*I am unlikeable*". Example items loading on the 'anxious appearance' factor include "*I will be unable to speak*" and "*I am going red*". The correlation between the two factors for the Belief rating was $r = 0.83$ and $r = 0.81$ for the Frequency rating. This suggests that the two factors show moderate overlap as we would expect, but they seem to measure slightly different aspects of social anxiety-related cognitions.

Although here we identified two factors compared to the three/four specified in the factor analysis undertaken by Clark [7] in the adult SCQ, there is notable overlap in the apparent underlying constructs. For example, the first factor of the adult SCQ relates to negative self-concept, as we found here, and the second and third factors reflected anxious appearance, as our second factor did. The two factors are consistent with leading cognitive behavioural accounts of social anxiety [1, 3, 4]. These accounts align to suggest that unconditional negative beliefs about the self, such as "*I'm unlikeable*", lie at the heart of social anxiety, as do cognitions related to social performance deficits and observability of anxious feelings. The finding is important as it supports the suggestion that adult cognitive models of social anxiety, such as that of Clark and Wells [4] are also relevant to youth [12].

Typically measures of beliefs and cognitions in youth anxiety have assessed either the frequency or the strength of the belief. We believe the CASCQ is unusual in measuring both frequency and belief ratings. Each shows substantial correlations with social anxiety. The correlation between frequency and belief ($r = 0.71$) suggests approximately 50% shared variance. Although the two are interrelated, it seems possible that they index slightly different features of cognition and it is therefore worth retaining both. In the present sample the correlation between social anxiety and frequency ratings is somewhat higher than

between social anxiety and belief ratings. It would be interesting to examine whether this remains so in a clinical sample.

Encouragingly, the scale appears to be reliable, with excellent internal consistency for all the totals and subtotals. Examination of the patterns of association suggest that as expected, the CASCQ was positively and significantly correlated with a measure of social anxiety, but importantly the correlations with social anxiety symptoms persisted when controlling for depression symptoms and for generalised anxiety symptoms. This indicates that the observed associations are not an artefact of the relationship between symptoms of either depression or generalised anxiety and negative social anxiety-related cognitions.

The finding that socially anxious cognitions were more frequent and strongly held amongst girls compared to boys in our general population sample was as expected given the consistent finding of higher levels of social anxiety in females [36]. Similarly, the finding of an age effect was also expected, with higher levels of socially anxious cognitions in older, compared to younger, adolescents. Epidemiological studies consistently show increasing levels of social anxiety from early adolescence though to early adulthood [36].

The study has a number of limitations. The CASCQ was designed for children and adolescents, but we only recruited adolescents. It will be important to see how the measure performs with pre-adolescents. Our sample was recruited from schools. Future studies with clinic-recruited young people, including those with and without SAD, will be informative in terms of psychometric properties of the scale in a clinical population as well as its sensitivity and specificity. Participants completed the CASCQ at one time point only, and so we do not know how reliable the measure is over time. Finally, we note that our measures were exclusively self-report. We took this decision given the centrality of the internal veracity of these cognitions (rather than objective reality) to the persistence of social anxiety in cognitive behavioural accounts, but the inclusion of parent and/or teacher report symptom measures would be informative.

The present study describes the development of a measure of social anxiety-related cognitions for children and young people, the CASCQ and evaluation of its psychometric properties. With increasing interest in the adaptation of cognitive behavioural treatments for SAD, such as Cognitive Therapy for youth that have been proven to be highly effective for adult SAD [37], comes the need for questionnaires that measure key treatment targets. Here, we hope to have developed a tool that will be useful to both clinicians and researchers.

Summary

In this paper, we describe the adaptation of the Child & Adolescent Social Cognitions Questionnaire (CASCQ) from the adult version of the scale and its preliminary validation in a general adolescent school sample. Factor analysis indicated two factors provided best fit, reflecting 'negative self-concept' and 'anxious appearance'. We found evidence for good internal consistency and convergent validity for totals and subtotals. Findings from this preliminary study suggest that the CASCQ is a reliable and valid measure of social anxiety-related cognitions in youth and may be useful for research and clinical purposes.

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Declarations

Conflict of Interest DMC is the author of the Social Cognitions Questionnaire.

Ethical Approval All procedures were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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Trials

STUDY PROTOCOL Open Access

Online Social anxiety Cognitive therapy for Adolescents (OSCA): protocol for a randomised controlled trial

Eleanor Leigh* and David M. Clark

Abstract

Background: Adolescent social anxiety disorder (SAD) is common, impairing and persistent. There is a need to intervene early to avert its long-term consequences. Cognitive Therapy for SAD is the leading treatment for adults and shows promise for adolescents. However, given the scale of the problem of adolescent SAD and the limited availability of psychological therapists in child and adolescent mental health services, there is a substantial gap in service provision. Delivering therapy via the Internet may provide part of the solution to this problem. An Internet version of adult Cognitive Therapy for SAD has been developed, with outcomes similar to face-to-face therapy. We have recently adapted this treatment for use with adolescents with SAD. Here, we describe a randomised controlled trial designed to test the efficacy of Internet Cognitive Therapy for adolescent SAD compared to waitlist.

Methods/design: Forty adolescents aged 14–18 years with a diagnosis of SAD will be recruited via schools. Participants will be randomly allocated to Internet Cognitive Therapy or to waitlist. All participants will be assessed three times during the study—at baseline (pretreatment/wait), midtreatment/wait (week 8) and posttreatment/wait (week 15). Participants in the experimental arm will also complete weekly measures as part of the online program and they will be assessed at 3 and 6 months. Postwait, participants in the waitlist arm will be offered Internet Cognitive Therapy, and weekly and posttreatment data will also be collected for them. The trial aims to test whether Internet Cognitive Therapy is superior to waitlist in reducing social anxiety symptoms and in reducing the proportion of adolescents meeting criteria for SAD. Other outcomes of interest include depression and general anxiety symptoms. Acceptability of the online treatment will also be evaluated.

Discussion: This randomised controlled trial will provide preliminary evidence on whether this intervention, requiring relatively low levels of therapist input, is safe and clinically effective. If this is shown to be the case, Internet Cognitive Therapy for adolescents has the potential to provide a service to the large population of adolescents with untreated SAD.

Trial registration: ISRCTN Registry, ISRCTN15079139. Version 1 registered on 06/02/2019.

Keywords: Adolescence, Social anxiety disorder, Cognitive behaviour therapy, Internet therapy, Psychological therapy, Young people

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Background

Social anxiety disorder (SAD) is the third most common mental health disorder [1], with prevalence rates estimated to be as high as 10% by the end of adolescence [2]. Almost all cases of SAD occur during the adolescent years [1]. It is associated with substantial impairment in relationships [3], educational attainment [4], and day-to-day functioning, as well as an elevated risk of further anxiety and depressive disorders [5]. For the majority of sufferers, the disorder is characterised by a persistent course [6, 7]. Intervening in the early stages of SAD has the potential to offset the multiple, negative consequences associated with the disorder.

Currently the most common psychological treatment approach for adolescents with SAD is generic forms of cognitive behaviour therapy (CBT) developed for a range of anxiety disorders. Unfortunately, young people with SAD have significantly poorer outcomes from these treatments compared to those with other anxiety disorders [8–13]. For example, for 7–17 year olds, remission from SAD was 40.6% compared to 72% for separation disorder or generalised anxiety disorder [9]. Disorder-specific psychological therapies (e.g. [14–16]) have been shown to outperform waitlist but there is limited evidence of specific treatment effects, in the sense of being superior to other credible interventions. In contrast, for *adults* with SAD, a form of individual psychological therapy, Cognitive Therapy based on the Clark and Wells [17] cognitive model, has been shown to be more effective than a wide range of alternative therapies in a network meta-analysis (Mayo-Wilson et al., [18]) and is one of the first-line treatments recommended by the National Institute for Health and Care Excellence (NICE, [19]). Turning to young people, the NICE guideline recommends that the use of Cognitive Therapy should be considered for older adolescents with SAD. In line with this, we have demonstrated promising findings in a case series (Leigh & Clark, [20]) in which we adapted Cognitive Therapy for adolescents. Furthermore, Ingul et al.([21] undertook a randomised controlled trial (RCT) comparing individual therapy based on the Clark and Wells cognitive model [17] to group CBT [22] and an attention placebo. Even though the individual therapy provided in the trial was an attenuated form of Cognitive Therapy for SAD, it was found to outperform both comparator conditions, providing preliminary evidence of specific treatment effects. Taken together, it seems that Cognitive Therapy based on the Clark and Wells model may hold promise as an effective treatment for adolescent SAD [23].

Whilst there are encouraging advances in treatment development for adolescent SAD, there are major obstacles to treatment access and service provision. Most young people with mental health disorders do not receive any treatment and the treatment gap is particularly large for youth with anxiety disorders [24]. For example, the US National Comorbidity Survey reported that less than one in five adolescents received services for an anxiety disorder, and only 12% of young people with SAD received any treatment, rising to 21% amongst those with severe SAD [24]. Even for those who do access treatment, the majority do not receive an adequate, evidence-based intervention [25]. There are many reasons for the unmet need. These include parent and child level factors, such as stigma, lack of awareness and low trust in professionals [26], and also service level factors, including failure to detect SAD by primary care professionals, limited resources of Child and Adolescent Mental Health Services (CAMHS), leading to long waiting times, and a limited number of trained therapists [27].

There is clearly a need to develop effective, scalable treatments in order to bridge the treatment gap that exists for the majority of adolescents with SAD. One potential solution to the problem of limited access is the use of the Internet to deliver therapy. Potential benefits to services of Internet-delivered therapy include reduced therapist time and reduced burden on clinics, for example, by lowering the need for clinic space. There are also a number of potential advantages of Internet therapy to young service users and their families. Internet therapy may be more convenient because young people can use the treatment programme when it suits them. Travel time and costs for attending sessions are minimised. The disruption to schooling caused by therapy sessions, typically scheduled during working hours, is also almost eliminated. Young people interact with the online environment in all aspects of their lives and so receiving treatment this way may be especially appealing to this cohort. Accessing a treatment online may provide a greater sense of confidentiality and reduced embarrassment [28] which will be especially important for adolescents with social anxiety for whom feelings of shame and embarrassment are typical [29].

Our team have developed and tested an Internet version of Cognitive Therapy for SAD for *adults*. Therapist contact is all remote (email, text, phone) and therapist time is reduced to only 20% of that in face-to-face therapy [30]. A recent RCT with socially anxious adults found that the Internet therapy has similar effects to face-to-face Cognitive Therapy (Clark et al., in preparation). We have recently undertaken a consultation study with young people to identify how this adult Internet treatment needs to be adapted to meet the needs of an adolescent SAD population. Only minor adaptations were suggested, for example ensuring that case examples are relevant to young people (e.g. describing adolescent-relevant situations, such as being at school and seeing friends, rather than being at work).

The primary aim of this Online Social anxiety Cognitive therapy for Adolescents (OSCA) trial is to examine the effectiveness of Internet Cognitive Therapy for adolescents with SAD compared to waitlist within a school setting.

We hypothesise that treatment with OSCA will be superior to waitlist in reducing symptoms of social anxiety and that the proportion of adolescents meeting criteria for social anxiety disorder will be lower posttreatment compared to postwait. We hypothesise that gains will be maintained at 3- and 6-month follow-up. We also expect that treatment with OSCA will be superior to waitlist in reducing symptoms of general anxiety and depression. We will gather data on the acceptability of the treatment. We will also examine whether proposed psychological process variables mediate any observed change in social anxiety symptoms after OSCA, and whether we can predict who will benefit in particular from OSCA. The results of the present clinical trial will be used to improve access to effective psychological treatments for socially anxious adolescents.

Methods/design

Design

The study is a two-arm RCT conducted in secondary schools in the United Kingdom (UK). The experimental arm is Online Social anxiety Cognitive therapy for Adolescents (OSCA). The comparison arm is waitlist. All participants will be assessed three times: at baseline (pretreatment/wait), midtreatment/wait (week 8) and posttreatment/wait (week 15). Participants in the experimental arm will also be assessed at 3- and 6-month follow-up. Postwait, participants in the waitlist arm will be offered OSCA. Assessments will be undertaken with parents as well where possible. Figure 1 shows the trial flow diagram. The trial has received approval from the University of Oxford Medical Sciences Division Research Board and it has been prospectively registered (http://www.isrctn.com/ISRCTN15079139).

The basic trial methods of enrolment, interventions, and assessments are summarised in Fig. 2. The Standard Protocol Items: Recommendations for Interventional Trials (SPIRIT) checklist is provided as Additional file 1.

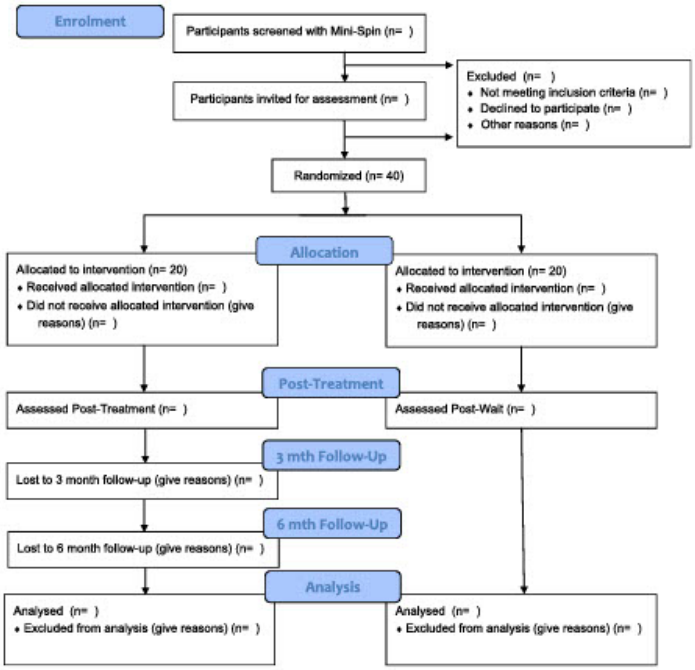
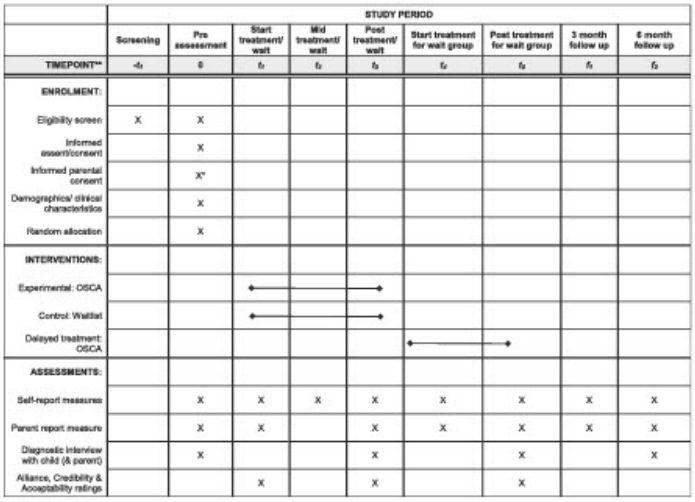


Fig. 1 OSCA trial flowchart



	STUDY PERIOD								
	Screening	Pre assessment	Start treatment/ wait	Mid treatment/ wait	Post treatment/ wait	Start treatment for wait group	Post treatment for wait group	3 month follow up	6 month follow up
TIMEPOINT**	$-t_0$	0	t_1	t_2	t_3	t_4	t_5	t_6	t_7
ENROLMENT:									
Eligibility screen	X	X							
Informed assent/consent		X							
Informed parental consent		X*							
Demographics/ clinical characteristics		X							
Random allocation		X							
INTERVENTIONS:									
Experimental: OSCA			←	—	→				
Control: Waitlist			←	—	→				
Delayed treatment: OSCA						←	—	→	
ASSESSMENTS:									
Self-report measures		X	X	X	X	X	X	X	X
Parent report measure		X	X		X	X	X	X	X
Diagnostic interview with child (& parent)		X			X		X		X
Alliance, Credibility & Acceptability ratings			X		X		X		

Fig. 2 SPIRIT figure for OSCA trial

Participants

A total of 40 adolescents aged between 14 and 18 years at intake with a diagnosis of SAD will be included. Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-5) diagnosis will be determined by the Anxiety Disorders Interview Schedule for children and parents [31]. Only adolescents for whom SAD is the primary problem will be included. All participants must be able to read and write in English due to the nature of the therapy and the need to complete self-report questionnaires.

Young people who are currently receiving any other psychological intervention or who have previously received Cognitive Therapy or CBT for SAD will not be invited to take part. Other exclusion criteria include: the presence of an autism spectrum disorder; learning disability; current alcohol or substance dependence; presence or suspected presence of psychosis; suicidal intent or recurrent self-harming behaviour; and young people identified by social services as currently 'at risk' due to child protection concerns.

Sample size

Sample size was estimated from an RCT of adolescents with SAD comparing a version of face-to-face Cognitive Therapy with attention placebo (Ingul, Aune, & Nordahl, 2014). The comparison effect size posttreatment was 1.26. A recent adult RCT by our group suggests outcomes for face-to-face and Internet-delivered Cognitive Therapy are similar. Based on a conservative estimate of the effect of 1.0, we would need 17 per group for 80% power. The sample size was inflated to allow for drop out following randomisation [32], resulting in a final sample size of 40.

Recruitment and randomisation

Participants will be recruited via secondary schools. The use of schools as a referral source has two advantages. It will ensure adolescents with a range of symptom severity will be included and it fits with potential future delivery mechanisms for the treatment, should efficacy be demonstrated.

For the screening stage, during class time in school, young people will be asked to complete the Mini-SPIN [33] and to indicate whether or not they would like to learn more about the study. The Mini-SPIN is a three-item questionnaire that is sensitive and specific to SAD in adults [34] and adolescents [35]. We were guided in how best to recruit participants in a non-stigmatising way in consultation with school students. Prior to initiating recruitment in schools we will send information out to parents informing them of the project and providing details of what will be happening in their child's school.

The process of seeking informed consent will differ for 14 to 15 year olds and 16 to 18 year olds. This is because 16 to 18 year olds will be treated as 'competent youth' for the purposes of this study. For 14 to 15 year olds, information about the study will be provided to the young person after parental consent has been obtained. For 16–18 year olds, information about the study will be

provided to the young person directly, without seeking parental consent first. At least 24 h after information has been given to the young person, a meeting will be scheduled during school hours. At this meeting written assent/consent will be sought. Once written assent/consent has been obtained, the full pre-intervention assessment will be completed. This will involve ensuring all eligibility criteria are met. For 16–18 year olds, we will also seek their agreement to contact parents in order to inform them of their child's involvement in the project.

Adolescents meeting inclusion criteria and not meeting any exclusion criteria will be randomised to waitlist or treatment. Adolescents not eligible to take part after the parent and young person assessments will be supported in accessing help via alternative means (if they would like this). Eligible participants will be randomly allocated to OSCA or waitlist. Individual randomisation will be conducted using an online minimisation algorithm generated by the trial statistician. The ratio will be 1:1. Minimisation will ensure balance between trial arms for gender, but will retain a random element and will be stratified by severity. Randomisation will occur after consent has been taken and baseline measures have been completed. It will be done by the Oxford Cognitive Health and Neuroscience Clinical Trials Unit. The trial team will email details of the stratification variables to the independent statistician who will then randomise the participant. Following randomisation, participants will be notified of their allocation.

Interventions

OSCA uses the same Internet platform as the adult programme with minor adaptations. We undertook a small study in which five young people (aged 16–18 years) worked through the adult online programme and then provided their feedback and suggestions for adaptations for adolescents. The programme was well received, and only minor adaptations were suggested. Specifically, the young people suggested that some video clips be re-filmed with young actors and that the case examples were relevant to young people (e.g. describing adolescent-relevant situations, such as being at school and seeing friends, rather than being at work).

The OSCA program takes 14 weeks. All users receive a core set of modules to work through at the beginning of the programme. The programme is then individualised for each user. The therapist releases modules that will be most helpful to that person, depending on their particular concerns. Adolescents complete OSCA modules at home and they can logon as often as they like. During the 14 weeks of treatment, young people allocated to OSCA will have a 15-min phone conversation with their therapist each week, in line with procedures in the adult treatment trial (Clark et al., in preparation). The telephone call is to support and encourage young people and to ensure that they are given access to all of the parts of the program that are most helpful to them. In addition, they will receive regular encouragement and support via secure messaging within the online programme and SMS texts.

We will seek to keep all parents updated on their child's progress in treatment. This will be explained to children aged 14–15 years. Consent for this will be sought from young people aged 16–18 years. Parental involvement will involve regular emails with a short general summary of therapy modules.

The only contact with participants in the waitlist arm during the wait period will be at the midwait time point, when they are requested to complete outcome measures. Participants in the waitlist arm will be offered treatment with OSCA after the postwait assessment.

One of the benefits of Internet treatments is their high fidelity [36]. The therapist (EL) was involved in the development of Cognitive Therapy for SAD in adolescents. Throughout the trial they will receive supervision from the developer of the cognitive model of SAD, the face-to-face and Internet versions of Cognitive Therapy for SAD, and the version for adolescents (DMC).

Outcomes

Primary outcome measures

The primary outcomes will be changes on the self-report version of the Liebowitz Social Anxiety Scale for Children and Adolescents–Self-report Version (LSAS-CA-SR) [37], and recovery from SAD. To assess recovery, the proportion of adolescents who continue to meet DSM-5 diagnostic criteria for SAD at posttreatment/wait will be examined. Diagnosis will be made using The Anxiety Disorders Interview Schedule IV for Children and Parents (ADIS-C/P) [31]. All participants will be interviewed with the child version and parents will be interviewed where possible. Participants who withdraw from the study will also be invited to complete the assessments. Assessments will be completed face-to-face or over the telephone by trained assessors. See Table 1 for timings of outcome measures.

Secondary outcome measures

As secondary outcomes, changes on a measure of aspects of social anxiety (the Social Phobia Weekly Summary Scale [38]), general anxiety as measured by the Revised Child Anxiety & Depression Scale (RCADS, self-report [and parent report where possible]) [39] and depression as measured with the Short Mood and Feelings Questionnaire (SMFQ) [40] will be examined. Social functioning (including social satisfaction, friendship quality and peer victimization) will be assessed by self-report questionnaire and school functioning will be captured through percentage attendance and grade average (either internal or

external examination scores or grade estimate). Self-reported ability to concentrate in class will be measured [20]. See Table 1 for timings of outcome measures.

The following measures of possible mediators of therapeutic improvement will be used: the Adolescent Social Cognitions Questionnaire (ASCQ); Adolescent Social Behaviours Questionnaire (ASBQ); and Adolescent Social Attitudes Questionnaire (ASAQ). These three measures were all adapted for adolescents by the authors from versions developed for socially anxious adults [38].

Measure of alliance and treatment credibility and acceptability

The quality of the therapeutic relationship, as perceived by both the therapist and the participants, will be assessed with the shortened Working Alliance Inventory [41] as a potential predictor of outcome. Participants will rate treatment credibility with the Credibility of Therapy Scale [42] as another potential predictor of outcome. Feedback questionnaires will be completed posttreatment to assess the acceptability of the treatment.

Blinding

Blinding of therapists and participants is not possible due to the nature of the design. However, assessments will be carried out by independent raters who are blind to allocation. The independent raters will be psychology graduates or above. All will have received training in the use of the outcome assessment. All will have demonstrated reliability in administration of the ADIS-C/P.

Data completeness and monitoring

In our adult trials of Cognitive Therapy, data completeness has always been above 95%. Methods to enhance data completeness that we will adopt include the use of session-by-session outcome monitoring (so if someone drops out early the last available symptom measure can be used) and weekly outcome-measure informed supervision. As a phase I trial, a Data Management Committee was not considered to be necessary. As such, the trial team is responsible for monitoring and management of the data. Data will be monitored for completeness, consistency and plausibility by the trial statistician. The trial team and statistician will have full access to the final trial dataset. The study data will be reported in line with current CONSORT guidelines.

Statistical analysis

All analyses will be intent-to-treat. No interim analyses are planned. Outcomes will be compared with hierarchical linear modelling. Time (midwait/midtreatment and postwait/posttreatment), treatment condition (OSCA, waitlist) and the time–condition interaction will be specified as categorical fixed factors, with baseline LSAS and gender as fixed covariates and participant as a random effect to account for between-person variation. Exploratory analyses using linear mixed effects models for each step to account for the nested data structure [43] will test for mediation of OSCA on social anxiety symptoms at posttreatment through candidate process variables from the cognitive model. Baseline outcomes will be included as predictors in all models. Categorical outcomes (response, remission, deterioration and diagnostic status) will be analysed using logistic regression, with treatment condition as the independent variable and baseline LSAS score and gender as covariates.

Safety aspects

Potential risks to the participant are minimal. There is potential for inconvenience because the young person is invited to take part in a treatment that will involve a time commitment. The potential for inconvenience will be minimised by virtue of the online nature of the treatment: young people can decide when and where are most convenient for them to complete treatment modules. Young people are free to withdraw from the study at any time.

In principle, there is potential for distress while completing OSCA. The likelihood of this is low because the program is goal-oriented in nature; young people did not become upset receiving the treatment in our previous case series. We will minimise this risk by fully explaining the nature of the program to young people. The young person is free to withdraw from the project at any time. In our pilot case series none of the adolescents who were treated showed an overall deterioration in their symptoms. Instead, everyone showed some benefit. This is consistent with the findings from our adult trials. We therefore consider the risk of symptom exacerbation to be low. Weekly measures of social anxiety and depressed mood will be taken and so any signs of deterioration will be detected quickly in the unlikely event that this should occur. An item assessing risk to self will be inserted into the SMFQ from the long version of the scale (item 19). Scores on this item will be reviewed weekly by the therapist to monitor levels and changes in risk. If signs of deterioration or an elevation in risk are identified, then the young person will be contacted and the appropriate procedures will be followed. An aim of the OSCA trial is to examine the safety of the treatment. We will do this in two ways. Adverse events (any untoward occurrence in an individual to whom the intervention has been administered, including occurrences which are not necessarily caused by or related to that therapy) will be monitored and recorded from randomisation to the final follow-up at 6 months. We will also assess reliable deterioration on the LSAS-CA-SR (our primary outcome measure).

Table 1 Schedule of self-, parent- and therapist-report measures

	STUDY PERIOD								
	Start treatment/ wait	Sessional Treatment only	Mid treatment/ wait	Sessional Treatment only	Post treatment/ wait	Start treatment for wait group	Post treatment for wait group	3 month follow up	6 month follow up
TIMEPOINT**	t_1	$t_2 - t_7$	t_8	$t_9 - t_{14}$	t_{15}	t_{16}	t_{17}	t_1	t_2
PRIMARY OUTCOMES:									
LSAS-CA-SR	X	X	X	X	X	X	X	X	X
ADIS-Child (& Parent) Report	X				X		X	X	X
SECONDARY OUTCOMES:									
RCADS-Child Report	X				X	X	X	X	X
Short MFQ	X	X	X	X	X	X	X	X	X
ASPWSS	X	X	X	X	X	X	X	X	X
Concentration	X		X		X	X	X	X	X
Social Functioning Scale	X		X		X	X	X	X	X
Peer Victimisation Scale	X		X		X	X	X	X	X
RCADS-Parent Report	X				X	X	X	X	X
POSSIBLE MEDIATORS:									
ASCQ	X	X	X	X	X	X	X	X	X
ASAQ	X		X		X	X	X	X	X
ASBQ	X		X		X	X	X	X	X
POSSIBLE PREDICTORS:									
WAI (Therapist & Self Report)	X[1]								
Credibility Scale	X[1]								
SERVICE USER FEEDBACK:									
Acceptability Questionnaire					X		X		

Notes: X[1] Alliance and Credibility questionnaires completed after session 2 of OSCA.
Abbreviations: LSAS-CA-SR = Liebowitz Social Anxiety Scale for Children and Adolescents, Self-Report Version; ADIS = Anxiety Disorders Interview Schedule; RCADS = Revised Children's Anxiety & Depression Scale; MFQ = Mood & Feelings Questionnaire; ASPWSS = Adolescent Social Phobia Weekly Summary Scale; ASCQ = Adolescent Social Cognitions Questionnaire; ASAQ = Adolescent Social Attitudes Questionnaire; ASBQ = Adolescent Social Behaviour Questionnaire; WAI = Working Alliance Inventory.

Half of the participants will be randomly allocated to the waitlist condition. During this 14-week period the only contact they will have with the research team is at the midwait stage when they will be asked to complete questionnaires. It is possible that participants in the waitlist condition will require treatment during this period. Participants and their parents will be advised that they should seek services and help as required.

The online treatment programme has numerous security features representing current best practice and complies with NHS data security standards. It employs secure client-server communication, full encryption of the server database, enforcement of strong passwords, two- factor authentication and hosting on a tier 4 hosting server. External access to the database using SSH protocol is prohibited. The system has been subjected to industry-standard penetration testing. Online data are secured by encryption to prevent access from outside parties. Access to the server data by the software company hosting the online therapy programmes (FRY-IT) is protected by non-disclosure agreements and the Data Protection Act (1998).

Service user involvement

Young people, both healthy school pupils and service users, have been involved in all stages of the project. Service users have been involved in the development of the questionnaires and the worksheets used to support face-to-face Cognitive Therapy and OSCA. Young people have provided detailed advice on how to adapt adult online Cognitive Therapy for young people. Pupils have advised on how best to recruit young people in schools. A small group of young people have requested to remain involved in a consultation role throughout the trial.

Discussion

Given the prevalence of social anxiety in adolescents and the very limited number of child therapists in the NHS, we are faced with the challenge of developing effective, scalable treatments. Here, we describe the protocol for a RCT that aims to examine the efficacy of a newly

developed online version of Cognitive Therapy for SAD in adolescents (OSCA) compared to waitlist control. If superiority of OSCA can be demonstrated, this will have important implications for treatment provision.

The majority of adolescents with SAD are not accessing services despite experiencing high levels of symptoms and impairment [24]. There may be a number of reasons for this, including perceived stigma and shame, a lack of understanding of the care system or a shortage of appropriate CAMHS services. Two aspects of the OSCA trial design have the potential to overcome at least some of these obstacles and improve outcomes for socially anxious young people.

Using the Internet to delivery therapy provides a number of practical advantages over face-to-face therapy, including reduced therapist and clinic burden and high treatment fidelity. In addition to this, as highlighted in the recent Government Green Paper (2017), schools may provide an ideal setting to intervene early in youth mental health difficulties, potentially overcoming various obstacles to accessing care. For example, it would sidestep the potential issue of underdetection of SAD by primary care physicians [27]. Likewise, screening programs are likely to identify young people with SAD who have not sought help, for example due to feelings of shame, embarrassment or failure by family members to appreciate the severity of the problem. It would also reduce the burden and interference associated with attending appointments at a clinic.

Conclusions

The aim of the trial is to determine whether OSCA, an Internet version of Cognitive Therapy for adolescent SAD delivered via schools, is effective compared to a waitlist control. Data about the acceptability of the treatment and suggestions for ways to improve OSCA will be sought from young people and parents. If the intervention is found to be effective compared to waitlist, then a future trial could compare the Internet intervention to face-to-face therapy, to examine clinical outcomes and costs. OSCA has the potential to improve the treatment outcomes and future prospects for adolescents with SAD, the majority of whom are not currently receiving treatment, as well as reduce the burden on over-stretched CAMHS services.

Additional file

Additional file 1: SPIRIT 2013 Checklist: Recommended items to address in a clinical trial protocol and related documents. (DOC 119 kb)

Abbreviations

ADIS-C/P: Anxiety Disorders Interview Schedule for Children and Parents; ASAQ: Adolescent Social Attitudes Questionnaire; ASBQ: Adolescent Social Behaviour Questionnaire; ASCQ: Adolescent Social Cognitions Questionnaire; CAMHS: Child and Adolescent Mental Health Service; CBT: Cognitive behaviour therapy; CONSORT: Consolidated Standards of Reporting Trials; DSM-5: Diagnostic and Statistical Manual of Mental Disorders, 5th edition; LSAS-CA-SR: Liebowitz Social Anxiety Scale for children and adolescents self-report version; Mini-SPIN: Mini Social Phobi Inventory; NICE: The National Institute for Health and Care Exellence; OSCA: Online Social anxiety Cognitive therapy for Adolescents; RCADS: Revised Children's Anxiety and Depression Scale; RCT: Randomised controlled trial; SAD: Social anxiety disorder; SMFQ: Short Mood and Feelings Questionnaire; SPIRIT: Standard Protocol Items: Recommendations for Interventional Trials; WAI: Working Alliance Inventory

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We are particularly grateful to all the young people and their families who have helped with the treatment development and study planning.

Trial status

Protocol version 1.0, dated 06/02/2019. Trial recruitment is expected to run from March 2019 to March 2020.

Authors' contributions

Both authors contributed to the design of the trial and the trial protocol. EL wrote the protocol. DMC read, contributed to and approved the final manuscript. Both authors read and approved the final manuscript.

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Availability of data and materials

After publication of the study results, the individual participant data will be made available via the Bodleian-ORA data repository. Data available will be research data reported in the publication, with the exception of data that could compromise participant anonymity.

Ethics approval and consent to participate

Ethics approval was granted by the Medical Sciences Division Ethics Committee at the University of Oxford (reference R60464/RE001). All participants aged 16–18 years will provide written informed consent; 14–15 year olds will provide written informed assent and written informed consent will be sought from their parents. The trial will be conducted in compliance with the principles of the Declaration of Helsinki (1996), the principles of Good Clinical Practice. Annual reports and a final report at the conclusion of the trial will be submitted.

Consent for publication

Not applicable.

Competing interests

David M. Clark is a co-author of the Clark and Wells (1995) Cognitive Model of Social Anxiety Disorder.

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Confirmation of Ethical Approval

MEDICAL SCIENCES INTERDIVISIONAL RESEARCH ETHICS COMMITTEE

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CONFIDENTIAL

Ref: R54283/RE001

Dr Eleanor Leigh
Department of Experimental Psychology
University of Oxford
South Parks Road
Oxford

1st November 2017

Dear Dr Leigh

Research Ethics Approval - CUREC 1

Study title: Testing aspects of the cognitive model of social anxiety disorder in adolescents (Short Title: Cognitive Aspects of Adolescent Social Anxiety)

The above application has been considered on behalf of the Medical Sciences Interdivisional Research Ethics Committee (IDREC) in accordance with the procedures laid down by the University for Ethical Approval of all research involving human participants.

I am pleased to inform you that, on the basis of the information provided to the IDREC, the proposed research has been judged as meeting appropriate ethical standards, and approval has been granted for a period of **2 years**, commencing on **1st November 2017**. The reference number for this study is **R54283/RE001**.

This is **subject to:**

a) **your agreeing to follow Approved Procedure 25**

b) **it is your responsibility to comply with the requirements for administering any tests or questionnaires and, if in doubt, to contact the publisher of those tests or questionnaires.**

c) **if new research staff are engaged, the PI is responsible for ensuring they are suitably qualified by training and/or experience.**

I would like to remind you that your study may be selected for review by the MS IDREC during an annual audit.

Amendments

Should there be any subsequent changes to the study, which raise ethical issues not covered in the original application, you should submit details to the IDREC for consideration and approval. If there are significant alterations then the Committee will require a succinct letter explaining these. If your study received University Sponsorship through CTRG, then the amendment will first need to be submitted to CTRG for approval of continued Sponsorship.

Please do not hesitate to contact me if you have any queries.

Yours Sincerely

H. Barnby-Porritt

Dr. Helen Barnby-Porritt
Research Ethics Manager, Medical Sciences

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Ref: R60464/RE001

Dr Eleanor Leigh
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Oxford

22nd November 2018

Dear Dr Leigh

Research Ethics Approval - CUREC 1

Study title: A randomised controlled trial examining the efficacy of online social anxiety cognitive therapy for adolescents (OSCA) recruited from schools

Short title: OSCA: testing an online therapy for socially anxious

The above application has been considered on behalf of the Medical Sciences Interdivisional Research Ethics Committee (IDREC) in accordance with the procedures laid down by the University for Ethical Approval of all research involving human participants.

I am pleased to inform you that, on the basis of the information provided to the IDREC, the proposed research has been judged as meeting appropriate ethical standards, and approval has been granted for a period from **1st December 2018 until 1st January 2023**. The reference number for this study is **R60464/RE001**.

This is **subject to:**

a) **your agreeing to follow Approved Procedure 25**
b) **your following the BPS guidelines for online research**
c) **it is your responsibility to comply with the requirements for administering any tests or questionnaires and, if in doubt, to contact the publisher of those tests or questionnaires.**
d) **if new research staff are engaged, the PI is responsible for ensuring they are suitably qualified by training and/or experience.**

I would like to remind you that your study may be selected for review by the MS IDREC during an annual audit.

Amendments

Should there be any subsequent changes to the study, you should submit details to the MS IDREC for consideration and approval. Details of changes must be listed on an amendment form. If your study received University Sponsorship through CTRG, then the amendment will first need to be submitted to CTRG for approval of continued Sponsorship.