



Examining two of the ingredients of Cognitive therapy for adolescent social anxiety disorder: Back-translation from a treatment trial

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ABSTRACT

Background: Cognitive Therapy for Social Anxiety Disorder (CT-SAD) based on the Clark & Wells model is a complex intervention comprised of a series of therapeutic elements. Two of the key ingredients are the *self-focused attention and safety behaviour experiment* and *video feedback*. The present study examined the effects of these two therapeutic procedures in adolescents with SAD, as well as common themes of the young people's social fears and negative self-images.

Method: 35 participants with a diagnosis of SAD completed internet-delivered CT-SAD as part of a randomised controlled trial. We conducted a series of paired samples t-tests to evaluate the effects of the *self-focused attention and safety behaviour experiment* and *video feedback*. We applied Latent Dirichlet Allocation to identify latent topics based on participants' description of their social fears and negative self-images that were elicited during the course of these therapy procedures.

Results: Participants reported lower anxiety and more positive self-appraisals when focusing externally and dropping safety behaviours, compared to when focusing internally and using safety behaviours ($ps < 0.0025$). After they watched the videos compared to before, they reported more positive appraisals of their appearance and performance ($ps < 0.0025$). The differences in these outcomes were significantly larger when they focused internally and used safety behaviours, compared to focusing externally and dropping safety behaviours ($ps < 0.0025$). Topic modelling identified six social fear topics and five negative self-image topics.

Conclusions: Self-focused attention, safety behaviours, and negative self-imagery are modifiable with the 'self-focused attention and safety behaviour experiment' and 'video feedback' as part of internet delivered CT-SAD.

1. Introduction

Social Anxiety Disorder (SAD) is a highly prevalent (Kessler et al., 2005) and persistent condition (Bruce et al., 2005) that mostly first occurs before adulthood (Solmi et al., 2022). It often causes substantial impairment, affecting academic attainment (Vilaplana-Pérez et al., 2021), peer relationships (Chiu et al., 2021), and the risk of further anxiety disorders, depression, and suicidal thoughts (Chiu et al., 2024). Timely effective intervention for SAD in young people¹ therefore has the potential to deliver considerable benefits.

Great strides have been made in the treatment of adult SAD with the development of psychological therapies designed to reverse cognitive and behavioural mechanisms that are implicated in its persistence. One such treatment that has been shown to outperform a number of credible

alternatives is Cognitive Therapy for SAD (CT-SAD; Mayo-Wilson et al., 2014), which is based on the Clark and Wells' (Clark & Wells, 1995) model of social anxiety. The model seeks to explain the persistence of social anxiety. It suggests socially anxious individuals engage in heightened self-focus in social and performance situations, reducing the opportunity to gather feedback from their environment which may counter negative perceptions. Furthermore, when internally focused, individuals attend to symptoms of anxiety as well as excessively negative and distorted images of themselves and how they come across. To prevent or mitigate their social fears, socially anxious individuals engage in a range of safety behaviours, such as avoiding eye contact and rehearsing sentences. However, these safety behaviours inadvertently reduce the individual's opportunity to disconfirm their negative beliefs.

CT-SAD comprises a series of treatment elements designed to reverse

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¹ Young people and adolescents are used interchangeably here, to refer to young people aged 11–18 years.

Table 1
Paired sample t-tests for participants' ratings of average social fear belief, anxious feeling, anxious appearance, and performance (N = 34).

Outcome	With condition		Without condition		t(df)	d
	M	SD	M	SD		
Average social fear belief	56.58	21.60	22.24	15.14	t(33) = 10.11*	1.73
Anxious feeling	77.50	16.48	34.64	21.48	t(33) = 9.95*	1.71
Anxious appearance	68.53	21.27	29.18	20.42	t(33) = 10.02*	1.72
Performance	47.35	17.02	73.91	14.00	t(33) = -7.74*	-1.33

Note. *p < .0025. M = Mean, SD = Standard Deviation, t = t statistic, df = degrees of freedom, d = Cohen's d.

Table 2
Results of Topic modelling for social fears.

Topic	Label	Coherence	Prevalence	Top terms
1	long_paus	0.23	24.52	long, silenc, awkward, paus, long_paus
2	make_sens	0.30	21.50	make, weird, make_sens, sens, thing
3	person_bore	0.11	16.94	bore, person, convers, disinterest, uninterest
4	overli_nice	0.08	14.89	uncomfort, fidget, nice, awkward, person
5	stumble_word	0.25	12.08	word, stumbl, stumb_word, babble, strang
6	facial_express	0.55	10.07	stupid, express, facial, facial_express, idiot

the processes outlined in the model. Initially, the therapist and patient develop a personalized model of the processes involved in maintaining an individual's social anxiety. The therapist then guides the patient through an experiential exercise to test the adverse effects of self-focused attention and safety behaviours (hereon called the 'self-focused attention and safety behaviour experiment'). This involves the patient participating in a challenging social interaction task, once whilst using self-focus and safety behaviours and then again whilst focusing externally and reducing safety behaviours. Ratings of anxiety, self-consciousness, and appraisals of performance are compared between the two interactions to help the patient learn about the unintended negative effects of self-focus and safety behaviours. Subsequently, video

Table 3
Paired Sample t-tests of Anxious Appearance, Performance, Perceived Anxious Appearance, and Average Social Fear Belief, Before and After.

Condition (N)	Outcome	Before		After		t(df)	d
		M	SD	M	SD		
With (35)	Anxious appearance	78.26	9.77	37.77	19.98	t(34) = 12.13*	2.05
	Performance	37.86	15.99	67.26	15.93	t(34) = -7.83*	-1.32
	Average social fear belief	66.18	15.86	24.86	17.75	t(34) = 14.75*	2.49
Without (34)	Anxious appearance	40.29	20.15	15.18	16.15	t(33) = 7.42*	1.27
	Performance	68.69	17.14	81.09	16.84	t(33) = -3.50*	-0.60
	Average social fear belief	34.30	18.08	9.36	10.51	t(33) = 8.84*	1.52

Note. *p < .0025. N = Sample size, M = Mean, SD = Standard Deviation, t = t statistic, df = degrees of freedom, d = Cohen's d.

Table 4
Paired Sample t-tests for Distortion Scores Between 'with' and 'without' Conditions (N = 34).

Distortion scores	With		Without		t(df)	d
	M	SD	M	SD		
Anxious appearance	41.09	19.71	25.12	19.93	t(33) = 5.18*	0.88
Performance	-30.26	-21.94	-12.5	-20.85	t(33) = -5.19*	-0.89
Average social fear belief	40.48	16.03	24.94	16.45	t(33) = 3.35*	0.92

Note: *p < .0025, M = Mean, SD = Standard Deviation, t = t statistic, df = degrees of freedom, d = Cohen's d.

recordings of the interactions undertaken as part of the 'self-focused attention and safety behaviour experiment' are reviewed to help patients correct excessively negative images of their social performance (hereon referred to as 'video feedback'). In CT-SAD, video feedback is conducted after careful verbal preparation to help reduce processing biases that can interfere with the patient objectively viewing themselves on screen (see Warnock-Parkes et al. (2017) for a full description of video feedback). Following video feedback, patients receive training in externally focused attention, and then the focus of therapy shifts to behavioural experiments that help patients test and disconfirm their fearful beliefs about social interactions (see www.oxcadatresources.com for a full description of CT-SAD procedures).

Empirical evidence for the role of the processes specified in the model (self-focused attention, negative self-imagery, and safety behaviours) in social anxiety in adults has come from laboratory studies and from studies examining treatment components in CT-SAD (for reviews, see: Ng et al., 2014; Norton & Abbott, 2017; Piccirillo et al., 2016). For example, in relation to self-focused attention and safety behaviours, an experimental study with a community sample showed that manipulating these two processes during an interaction task modulated anxiety and self-perceptions of performance (McManus et al., 2008). Consistent with this, a study examining the effect of the 'self-focused attention and safety behaviour experiment' conducted in one session as part of a full course of CT-SAD was found to improve patient-reported state anxiety and appraisals of performance (McManus et al., 2009). Similar findings have been reported in relation to negative imagery. Experimental laboratory studies have found that reducing negative mental imagery during a social interaction task via instructions (Hirsch et al., 2003) and via video feedback (Hirsch et al., 2004) is associated with lower anxiety and

Table 5
Results of Topic modelling for negative self-images.

Topic	Label	Coherence	Prevalence	Top Terms
1	ey_contact	0.29	34.72	contact, ey_contact, ey, avoid, convers
2	fidget_hand	0.07	29.25	awkward, hand, nervou, red, talk, fidget
3	make_ey	0.49	13.45	make, ey, make_ey, make_ey_contact, contact
4	long_paus	0.28	13.39	paus, long, long_paus, speech, face, fidget
5	facial_express	0.30	9.19	nervou, uninterested, bore, shy, sound

improved social performance. This finding was replicated when the effects of ‘video feedback’ on state anxiety and self-reported performance completed in a single session of CT-SAD were examined (McManus et al., 2009). Additionally, a recent study by Wild et al. (2023) demonstrated that ‘video feedback’ reduced patients’ social anxiety and improved self-perceptions in both face-to-face and internet-delivered formats as part of a randomised control trial.

With the aim of improving treatment outcomes for young people with SAD (Evans et al., 2021; Skumsnes et al., 2024), there has been increasing interest in whether the processes outlined in the Clark and Wells (1995) model are also relevant to the persistence of adolescent social anxiety, and also in whether CT-SAD may be helpful for this population. Findings from adults cannot be assumed to be relevant to adolescents due to the ongoing maturation of relevant underlying social-cognitive processes such as perspective-taking, self-consciousness during this developmental period (Blakemore, 2008).

A number of cross-sectional and longitudinal observational community studies with young people support an association between negative thoughts, self-focused attention, negative self-imagery, and safety behaviours with social anxiety symptoms (Leigh & Clark, 2018). In addition, a recent study with clinic-referred adolescents found that negative thoughts and attitudes, self-focused attention and safety behaviours were elevated in young people with SAD compared to young people with other anxiety disorders (Leigh, Percy, et al., 2023). Experimental studies are a particularly powerful way to test the causal assumptions underlying the Clark and Wells model. To date, experimental studies with young people that have manipulated self-focused attention (Kley et al., 2011), safety behaviours and self-focused attention (Leigh et al., 2021), and self-imagery (Leigh et al., 2020) during interaction or performance tasks have found an association with increased state anxiety, more negative self-appraisals, and impaired performance in high socially anxious community samples of young people. However, few experimental studies have been carried out with clinical samples.

Two trials of CT-SAD with adolescents have been reported. A Norwegian trial randomly allocated 57 adolescents to individual CT-SAD, group graded exposure based CBT, or an attention placebo condition (equivalent contact time to active arms involving social activity and support but without purported active treatment elements) (Ingul et al., 2014). Across all outcome measures, the CT-SAD condition outperformed both graded CBT and attention placebo at post-treatment assessment, although the comparison between the treatment arms was confounded by the type of delivery (group vs. individual). A UK trial compared CT-SAD delivered online (called Online Social anxiety Cognitive therapy for Adolescents or ‘OSCA’) to waitlist in a sample of 43 young people aged 14–18 years with a diagnosis of SAD recruited through schools (Leigh & Clark, 2019). Large, controlled effects were observed across all outcome measures (Leigh & Clark, 2023) with a high level of treatment satisfaction (Leigh, Nicol-Harper et al., 2023), but further evaluation is needed with larger samples and active comparators.

Examining the effects of specific components of CT-SAD with adolescents may offer us the opportunity to further enhance outcomes by understanding which elements of CBT (Cohen et al., 2023) yield clinical benefit as well as contributing to our understanding of mechanisms of change (an approach that has been termed ‘back translation’). With this intention, we used data from the UK waitlist-controlled trial of OSCA (Leigh & Clark, 2023) to examine the effects of two elements of the treatment with adolescents: (1) the *self-focused attention and safety behaviour experiment* and (2) *video feedback*, on self-reported anxiety and self-appraisals.

We hypothesize that.

- (1) In the *self-focused attention and safety behaviour experiment*, participants would report lower anxiety and more positive self-appraisals when focusing externally and dropping safety behaviours (hereon called the ‘without’ condition) compared to self-

focusing and using safety behaviours (called the ‘with’ condition).

- (2) In *video feedback*, participants would report more positive appraisals of their appearance and performance after watching a video compared to before.
- (3) In *video feedback*, the differences in these outcomes (distortion scores) would be significantly greater in the ‘with’ than in the ‘without’ condition.

In addition to hypothesis testing, this study using secondary data from a preliminary RCT of OSCA aims to better understand the social fears and negative self-images typically experienced by adolescents with a diagnosis of SAD during the two therapeutic procedures. To do so, we conducted exploratory data analyses of patient reported social fears and negative self-images using topic modelling.

2. Methods

2.1. Participants

The study used secondary data collected as part of a preliminary trial of OSCA. Participants were 35 young people aged 14–18 years (89% female) recruited from four secondary schools in southeast England with a primary DSM-5 diagnosis of SAD who had all received OSCA as part of a randomised controlled trial (Trial registration: ISRCTN15079139); University of Oxford Medical Sciences Division Research Ethics Committee approval: R60464/RE001; Leigh & Clark, 2019), either immediately upon randomisation or after a 14-week wait period (Details of participant characteristics can be found here). The trial included 43 participants in total. All those who completed the two treatment components (whether or not they completed the trial) were included here (N = 35).

A priori power analysis was not conducted. Although the value of post-hoc power analysis is limited, they can inform interpretation of findings when based on predetermined effect sizes. We assumed a large effect size based on previous studies (McManus & Clark, 2009; Wild et al., 2023). At $p < .05$ with 35 participants, we would have 90% power to detect a large effect. The hypotheses and analyses were not pre-registered.

2.2. Procedure and measures

For the *self-focused attention and safety behaviour experiment*, participants identified their social fears before engaging in the social interaction task. Then after each interaction the following self-ratings were taken, each on a scale of 0–100: the extent to which they believed their particular social fears had been realised (*average social fear belief*); how anxious they felt (*anxious feeling*); how anxious they thought they looked (*anxious appearance*); and how well they thought they performed (*performance*). In addition, they indicated how much they used their safety behaviours and how self-focused they were after each interaction.

In *video feedback*, participants reviewed the videos of the two interactions carried out as part of the *self-focused attention and safety behaviour experiment* in the order that they had been carried out. Before watching the videos, young people completed sections of OSCA guiding them in how to watch the videos back. The content follows the procedure outlined in Warnock-Parkes et al. (2017). As part of the preparation, participants were asked to describe in detail what they expected to see in the videos. The description associated with the first conversation represents their ‘negative self-image’, which was used in topic modelling. Before and after each video, young people rated the extent to which they believed their anticipated social fears would be/had been realised (*average social fear belief*); how anxious they thought they would look/did look (*anxious appearance*), and how well they thought they would do/did do (*performance*).

2.3. Data analysis

Data was analysed in R Studio (R Core Team, 2024). Paired samples *t*-tests were used to assess whether there were statistically significant differences in outcomes between the 'with' and 'without' condition (Hypothesis 1) and before and after watching videos (Hypothesis 2). The outcomes were: average social fear belief, anxious feeling, anxious appearance, and performance. Shapiro-Wilk normality tests were performed to examine data normality, and statistical assumptions for parametric test were met for all the analyses. Paired samples *t*-tests were used to examine if distortion scores were higher in the 'with' compared to the 'without' condition (Hypothesis 3). We applied Bonferroni correction with an adjusted alpha value of 0.0025 to correct for multiple testing. One participant reported missing value on safety behaviour and one participant did not report their beliefs and feelings after watching videos. Excluding these data points from our analyses did not change the statistical significance of our test results.

We conducted Latent Dirichlet Allocation (LDA) to explore possible themes of participant reported social fears and negative self-imagery, using the *textmineR* package (Jones et al., 2018). LDA is a probabilistic topic modelling technique that is used to discover latent topics from text documents. It assumes each text document consists of a mixture of topics, and each topic is a set of words that frequently co-occur. It identifies which topics are present in each document and to what extent. It also determines which words are most representative for each topic. It uses an iterative process to refine these distributions. This method has been increasingly applied in psychology research to identify latent topics from text data (Chiu et al., 2022; Hagg et al., 2022).

To conduct LDA, we created a document-term matrix representing the frequency of occurrence of each term. Preprocessing steps were applied: Lowercasing, removing punctuation and numbers, eliminating stop words, stemming (e.g. from 'long_pause' to 'long_paus'), and removing infrequent words. We then applied LDA to the pre-processed document-term matrix, considering *n*-gram up to three words to capture relevant phrases. The LDA model was fitted using Gibbs sampling with 2000 iterations. Hyperparameters alpha and beta were set to 0.1 and 0.5 respectively. The resulting topics were interpreted by examining the top five terms for each topic. We tested models with *k* ranging from 2 to 50, evaluating each using coherence scores. Coherence measures the degree of similarity between words within a topic. The higher the coherence value, the better the topic quality. In addition to coherence, we estimated the prevalence of each topic, which indicates how much a particular topic is presented across all data points. We reported a LDA model with a *k* value that produced the highest average coherence score across topics. When using LDA, words may be grouped together simply because they frequently appear together, not because they are semantically related. To address this limitation, we reviewed how the terms appear in source documents by searching the term in the raw dataset, and considered the semantic coherence of terms within each topic. In line with the LDA Preferred Reporting Checklist (Hagg et al., 2022), we evaluated the relationships among topics by examining the intertopic distance maps generated by the *LDAvis* R package (Sievert & Shirley, 2014). These maps provide a visual representation of the relationships between topics. Each circle represents a topic, with its size representing its prevalence. The distance between the circle indicates how distinct the topics are from each other. Topics that are closer together on the map share more common words and are thematically similar.

3. Results

3.1. Self-focused attention and safety behaviour experiment

Participants rated themselves as significantly less self-focused ($t(33) = 14.26, p < .001$) and reduced use of safety behaviours ($t(33) = 15.77, p < .001$) in the 'without' condition than in the 'with' condition, suggesting the intended experimental manipulation was successful. In line

with Hypothesis 1, participants in the 'without' condition reported feeling less anxious, and believing that they looked less anxious, that their feared social outcomes were less likely to have occurred, and they had performed better, when compared with their ratings in the 'with' condition (See Table 1).

4. Discussion

The current findings build on previous studies with community samples of adolescents that have indicated the relevance of self-focused attention, safety behaviours and negative self-imagery to the persistence of social anxiety by pointing to their role in social anxiety amongst treatment-seeking young people, and to the value of the 'self-focused attention and safety behaviour experiment' and 'video feedback' as therapeutic techniques. These findings extend previous research on internet-delivered CT-SAD with adults, demonstrating that these two procedures from face-to-face CT-SAD can be effectively deployed in an online format and it will be important to replicate the finding in larger samples in future.

The 'self-focused attention and safety behaviour experiment' findings shed light on the effects of these processes on social anxiety. Specifically, in line with our first hypothesis, increasing self-focus and safety behaviour use during an interaction task was associated with higher anxiety and more critical self-judgements of anxious appearance and overall performance compared to reducing self-focus and safety behaviour use. Previous studies have demonstrated this finding in community samples (Leigh et al., 2021). To our knowledge this is the first study with a clinical sample, providing further support for the causal role of these processes in adolescent social anxiety, although the extent to which the observed effects are driven specifically by self-focused attention or by safety behaviours cannot be inferred because they were manipulated concurrently.

Findings from the 'video feedback' component are informative about the relevance of negative self-imagery to social anxiety. In line with our second hypothesis, we observed that individuals' perceptions of their anxious appearance and performance were substantially less negative after they had watched themselves on the video compared to before. Three previous experimental studies have reported the effects of manipulating imagery with socially anxious young people. Two used verbal instruction. In a community sample of high socially anxious adolescents Leigh et al. (2020) found that negative self-imagery was associated with significantly higher anxiety and self-perceptions compared to benign imagery during a social interaction task, contributing to an overestimation of anxious appearance compared to other peoples' perception. Using a between-subjects design, Alfano et al. (2008) compared anxiety and performance ratings of a performance task between three groups of adolescents: those with a diagnosis of SAD; a community sample instructed to engage in negative self-imagery; and a community sample given no instructions. The clinical group were more anxious and performed worse compared to the two groups, which speaks against the suggestion that negative self-imagery is causally implicated in social anxiety. However, it is difficult to draw firm conclusions from this study because neither the clinical nor the 'no instruction' community group were given any instructions and so we cannot determine the thought content during the task. A third study manipulated negative imagery in high socially anxious young people using video feedback with verbal preparation (rather than verbal instruction alone) (Parr & Cartwright-Hatton, 2009). Participants who received video feedback experienced improvements in anxiety and self-perceptions of performance compared to those in the no-instruction control condition who showed no change. The present study contributes to our knowledge base with findings from a clinical sample and provides further support for the relevance of negative imagery to the persistence of adolescent social anxiety. It also provides further support for the use of video feedback as a means of manipulating imagery with young people.

The effect of video feedback on individuals' self-perceptions was

large in both social interactions, but consistent with our third hypothesis and the Clark and Wells account of social anxiety, the effect was significantly larger in the 'with' self-focused attention and safety behaviours condition compared to 'without'. This may be because self-focus enhances access to internal information, such as distorted negative imagery, that is used to inform appraisals of one's social appearance and performance and reduces awareness of external, potentially disconfirmatory information, such as the other person's reactions in real time. In contrast, when individuals were instructed to focus on the other person and reduce safety behaviours, this contributed to greater awareness of external information and so a less distorted self-perception.

Topic modelling indicated there are six types of social fear topics and five types of negative self-image topics. Social fears predominantly revolve around one's speech, with participants expressing concerns about pausing, coherence, stumbling over words, and other people's reactions to their speech. Results suggest that individuals with SAD are particularly concerned about their speech. Although concerns about facial expressions also emerged as a topic, this topic is less common than speech-related fears (10% versus 75% prevalence). Negative self-images similarly include concerns around speech (13% prevalence) and facial expressions (9% prevalence) but fear around avoiding or not maintaining eye contact emerges as the most dominant topic, with a 47% prevalence. In sum, while social fears and negative self-images have similarities in content, there are also clear differences: social fear likely pertains to fear of not speaking well, while negative self-images are often related to difficulties with eye contact.

Whilst the study has strengths, including a clinical sample and an ecologically valid setting, there are limitations worth noting. First, the sample size was modest which can amplify effect sizes. Also, it was predominantly made up of girls, reflecting the wider sample included in the trial. Future studies with a larger sample and better balance of boys and girls would allow us to be more confident about the findings and to draw broader conclusions. Second, the order of the two conditions in the self-focused attention and safety behaviour experiment was not counterbalanced. This reflects the 'real world' nature of the study because the 'self-focused attention and safety behaviour experiment' is undertaken in this order as standard in treatment, but it means we cannot rule out the possibility that there is an order effect whereby participants typically feel more anxious and perform more poorly in the first conversation compared to the second. However, the studies of Leigh et al. (2021) with adolescents, and McManus et al. (2008, 2009) with adults that examined the same paradigm did counterbalance order of the two conditions and the effect persisted. Third, the reliance on self-report measures means we cannot draw conclusions about whether the perceived effects of the conditions translated to effects on actual social performance. Fourth, only data collected within one session of therapy undertaken in the trial is reported, but studies including follow-up data on symptoms over time would give insights into the persistence of effects. Fifth, whilst LDA is a data-driven approach to identify latent topics, human interpretations of these topics and their relationships remain essential. Therefore, whilst LDA identifies topics through statistical co-occurrence patterns, human judgement is necessary to validate their semantic meaning and contextual relationships. This human validation process inherently introduces some degree of subjectivity. Sixth, the use of single item measures is liable to random measurement error, reduced reliability, and misinterpretation. Development of valid and reliable brief multi-item measures of the outcomes of interest will be valuable for future studies.

The findings have clinical implications. Anecdotally we know that clinicians can have hesitations about delivering these two therapy procedures due to concerns about distressing their young patients. However, our finding that each procedure is associated with large positive changes in anxiety and self-evaluation when undertaken early in the course of therapy (in week two of OSCA), as is standard, points to their value and aligns with findings from a qualitative study of CT-SAD with young people, parents, and clinicians that the most salient features of the treatment are 'difficult, but good' (Taylor et al., 2021). Considering the

discovery of specific themes for social fears and negative self-imagery, clinicians are encouraged to attend to these unique concerns of their clients at formulation and treatment stages. A further concern clinicians raise is about delivering therapy techniques which they anticipate young people may find challenging, such as the self-focused attention and safety behaviour experiment and video feedback, in an online setting. The findings from the present study directly speak to this concern and suggest that these two core elements of CT-SAD can be successfully translated to an online setting.

There are several directions for future research. One avenue is to understand how generalisable the study findings are to other groups. It may be helpful to explore if any modifications are required for younger children under 14 years old, as well as socially anxious individuals who have social communication deficits, speech and language difficulties, or attentional deficits. Another way is to examine whether the effect persists in other social tasks, such as public speaking or group discussion. One further direction is to explore ways that could make these intervention components more accessible, such as having them delivered by non-specialised clinicians.

Whilst there have been a small number of studies examining the efficacy of the self-focused attention and safety behaviour experiment (McManus et al., 2009; Schreiber et al., 2015; Furukawa et al., 2009) and video feedback (McManus et al., 2009; Wild et al., 2023; Furukawa et al., 2009; Laposa & Rector, 2014; Laposa & Rector, 2023; Warlock-Parkes et al., 2017) in the context of treatment, to our knowledge none have been reported with young people. There is value in replication studies to increase our confidence in the findings and we hope that the present study will contribute to this endeavour. Our study aimed to look at the effects of two key elements of CT-SAD with a sample of young people with SAD, to add to our understanding of mechanisms of change and improve outcomes (Cohen et al., 2023). Our findings suggest self-focused attention, safety behaviours, and negative self-imagery are relevant targets of treatment in adolescent social anxiety and can be usefully modified with the *self-focused attention and safety behaviour experiment* and *video feedback* as part of CT-SAD.

CRediT authorship contribution statement

Eleanor Leigh: Writing – review & editing, Writing – original draft, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **David Clark:** Writing – review & editing, Funding acquisition, Conceptualization. **Kenny Chiu:** Writing – review & editing, Writing – original draft, Formal analysis.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jbtep.2025.102020>.

Video Feedback

In line with Hypothesis 2, Table 3 shows that participants believed that they looked less anxious and performed better after video feedback compared to the predictions that they had made beforehand.

Participants reported 140 descriptions of negative social outcomes that they feared may occur during the conversations. Examples included, 'I will not make sense', 'I will have nothing to say', 'there will be long silences'. The optimal number of topics (k) was determined based on the highest average coherence score, which peaked at six topics (see Fig. S1A). The coherence and prevalence values of each topic are presented in Table 2. The most prevalent topic was 'long_paus'. 'The topic *'overli_nice'* has the lowest coherence (0.08), meaning that the words within this topic were not closely related to each other. In Fig. S2A, the intertopic distance map shows that the topics are well-separated, meaning these topics are distinct from each other.

Consistent with Hypothesis 3, Table 4 shows that participants reported significantly higher distortion scores in terms of their anxious appearance, performance, perceived anxious appearance, and average social fear belief in the *'with'* compared to the *'without'* condition. These results suggest the differences between what they predicted beforehand and their judgements after viewing the videos were greater in magnitude when they self-focussed and used safety behaviours, compared to when they focussed externally and dropped safety behaviours.

Before watching themselves on videos, participants were asked to describe how they thought they would look in the videos ($N = 35$). When there were five optimal topics the average coherence value across topics was the highest (See Fig. S1B). As shown in Table 5, the most prevalent topic relates to eye contact (Topics 1 and 3). The topic named *'fidget_hand'* had the lowest coherence (0.07), meaning that the top terms within this topic were loosely related to each other. Fig. S3 shows that these five topics form three clusters, with Topics 1 and 3 as well as Topics 2 and 5, overlapping each other.

Data availability

Data will be made available on request.

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