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Optimising Exposure for Adolescents with Public Speaking Anxiety: Affect Labelling or Positive Coping Statements?

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Acknowledgements

This paper was supported by a Social Sciences PhD Studentship awarded to Hannah Plaisted. Polly Waite was supported by an NIHR Post-Doctoral Fellowship (PDF-2016-09-092). Cathy Creswell was supported by an NIHR Research Professorship (NIHR-RP-2014-04-018) and is supported by the NIHR Applied Research Collaboration Oxford and Thames Valley at Oxford Health NHS Trust. The views expressed are those of the authors and not necessarily those of the NHS, the NIHR or the Department of Health and Social Care. We would like to thank the young people and the schools who participated in the study and the actors for their contribution in the classroom audience footage. We would also like to thank Audrey Screen for her invaluable support with recruitment and during the pilot, Connie Heathfield, Georgia Brett and Jordan Herrington for their hard work rating speech videos, and Samantha Pearcey for her support with the word content coding. Finally, we would like to thank Michelle Craske for her contribution during the initial development of the study, and Anne Miers for her help in the development of the speech task. Research materials can be accessed by contacting the corresponding author.

Abstract

Cognitive Behavioural Therapy (CBT) is the first line treatment for anxiety disorders in youth however many adolescents do not benefit. Behavioural exposure is believed to be the critical ingredient of CBT and research with adults has shown that labelling affect, but not positive coping statements, enhances exposure outcomes. However, many CBT protocols for young people involve using positive coping statements alongside exposure. We compared the effects of exposure with positive coping statements, affect labelling, and neutral statements on fear responses in adolescents (age 13-14 years) with public speaking anxiety as they delivered a series of speeches in front of a pre-recorded classroom audience. Self-rated anxiety, heart rate, and observer ratings of expressed anxiety were assessed pre-test, immediate post-test and at 1-week follow-up. Neither affect labelling nor positive coping statements enhanced exposure on any measure from pre-test to 1-week follow-up. While there was an initial advantage of exposure with positive coping statements for post-speech self-reported anxiety, this effect was not maintained, and there was a significant increase in anxiety from immediate post-test to 1-week follow-up in this condition, compared to the other conditions. The short-term benefits from generating positive coping statements may explain why this is often employed in the treatment of anxiety problems in young people, but also indicate that it may not confer any advantage in the longer term. These intriguing findings highlight the urgent need for further attention to improve understanding of how to optimise exposure in young people and maximise treatment outcomes.

Key Words

Adolescents, Affect Labelling, Exposure, Positive Coping Statements, Public Speaking Anxiety

1. Introduction

Anxiety about public speaking typically manifests during adolescence (Stein, Torgrud, & Walker, 2000; Wittchen & Fehm, 2003) and presents a risk for and is one of the most frequently reported fears among young people with social anxiety disorder (Hofmann et al., 1999; Wittchen et al., 1999). Public speaking anxiety is highly prevalent in community populations (15-30%; Pull, 2012) and can cause clinically significant distress and marked interference with functioning in educational, social and employment domains (Stein, Walker, & Forde, 1996).

Although there has been little systematic evaluation of treatments for performance anxiety in adolescents, CBT is typically recommended as the first-line treatment for adolescents with social anxiety disorder, (e.g. National Institute for Health and Care Excellence, 2014; World Health Organization, 2015). A growing body of evidence suggests that the critical ingredient of CBT is behavioural exposure (Ale, McCarthy, Rothschild, & Whiteside, 2015; Peris et al., 2015; Whiteside et al., 2020). However, although exposure-based treatments are effective in treating anxiety disorders compared to wait-list controls (James, Reardon, Soler, James, & Creswell, 2020), many adolescents do not benefit. For example, Ginsburg et al., (2011) found that 59% of children and young people with social phobia did not recover following 14 sessions of CBT, with outcomes generally appearing to be particularly poor for adolescents compared to children (64% of adolescents vs. 48% of children with mixed anxiety disorders did not recover). While research with adults has highlighted the need for careful attention to the conditions that optimise (or minimise) the effectiveness of exposure for performance anxiety (Niles, Craske, Lieberman, & Hur, 2015), to date, there has been little examination of this among younger populations.

Evidence-based treatments for anxiety disorders, including performance fears and/or social anxiety disorder, in adolescents typically start with up to six to eight sessions of anxiety management, including cognitive reappraisal, with the primary aim of reducing anxiety and facilitating subsequent engagement in exposure (Kendall, Choudhury, Hudson, & Webb, 2002). While anxiety management strategies may facilitate *engagement* in exposure (Hofmann, Heering, Sawyer, & Asnaani, 2009; Van Den Hout, Kindt, Weiland, & Peters, 2002; Van den Hout, Van Pol, & Peters, 2001)), Inhibitory Learning Theory (ILT) suggests that they may potentially impede optimal outcomes being achieved (Craske, 2015). ILT proposes that original, fearful beliefs are not forgotten, but that they compete with new, non-fearful learning that occurs during exposure (Craske, 2015; Craske et al., 2008; Craske, Treanor, Conway, Zbozinek, & Vervliet, 2014) and, as such, the development and retrievability of new learning

(e.g., that the feared situation or stimulus is not dangerous) rather than habituation of fear responses, is key to successful exposure (Bouton, 2000; Craske, Liao, Brown, & Vervliet, 2012).

Opportunities for learning may be enhanced when there is a greater mismatch between what is expected and what actually occurs (Rescorla & Wagner, 1972). This is supported by experimental studies with adults that have shown that exposure is enhanced when expectations are violated (Baker et al., 2010); in other words greater learning takes place when a person has a positive (or non-negative) experience of a feared stimulus after expecting a highly negative outcome, than when they have entered the situation thinking, for example, "everything will be fine". There is evidence from studies with adults that explicitly verbalising negative affective states and feared outcomes ('affect labelling') during exposure to spiders reduced physiological arousal one week later, compared to the use of cognitive reappraisal (where there is typically encouragement to anticipate positive outcomes) or exposure alone, with a large effect (Kircanski, Lieberman, & Craske, 2012). Similarly, for adults who were fearful of public speaking, verbalising negative expectations and affect labelling prior to delivering a presentation was associated with a significantly greater reduction in physiological arousal during recovery from public speaking one week later compared to exposure alone, with effect sizes ranging from small to large (Niles, Craske, Lieberman, & Hur, 2015).

When it comes to younger people, studies have cast doubt on both the importance of pre-exposure anxiety management strategies in facilitating engagement in exposure (Whiteside et al., 2015) and the use of cognitive strategies, such as cognitive reappraisal through generating positive coping strategies (e.g., saying "It's unlikely people will laugh at me, they haven't laughed at me when I have given a speech before") to lower anxiety during exposure. However it remains uncertain whether the strategies that have been shown to optimise inhibitory learning in adults also apply to adolescents where fear learning differs in critical ways. Specifically, animal research has shown that both the expression and extinction of fear are temporarily impaired in adolescent rats compared to both younger and older rats (Ganella & Kim, 2014) and there is evidence from neurological (Johnson & Casey, 2015) and fear-conditioning (Waters, Theresiana, Neumann, & Craske, 2017) research with humans for diminished extinction learning in adolescents compared to children and adults. Examination of the effectiveness of inhibitory learning based strategies specifically within adolescents is a necessary step towards enhancing treatment for common fears and anxieties, such as public speaking fears, in this age range.

The aim of this study therefore was to explore the effects of affect labelling (labelling feared outcomes and affect states before exposure) and generating positive coping statements on exposure for public speaking anxiety in adolescents. Based on findings from the adult literature (Kircanski et al., 2012; Niles et al., 2015), we hypothesised that adolescents instructed to use affect labelling would show significantly greater reduction of fear than adolescents instructed to use positive coping statements and neutral statements, at 1-week follow up, but not immediately post-test. Given the limited evidence to guide directional hypotheses, we also explored whether there were significant differences in post-exposure anxiety between exposure with neutral statements and exposure with positive coping statements.

2. Method

2.1 Design

The study used a 3 (group) x 3 (time) mixed design with adolescents who were fearful of public speaking. Groups were exposure combined with (i) affect labelling (AL), (ii) positive coping statements (PCS) or (iii) a neutral sentence (Control). Assessment times were pre-exposure (Time 1), post-exposure (Time 2) and 1-week follow-up (Time 3).

2.2 Participants

Ninety-one adolescents (age 13-14 years) with anxiety about public speaking were recruited to the study between June 2016 and November 2017. See Table 1 for sample demographics and Figure 1 for a consort diagram of participant flow through recruitment and study procedures.

2.3 Recruitment

Four schools participated in the study and six classes from Year 9 were screened for eligibility (see Figure 1 Participant flow chart) during school assemblies. Adolescents who scored above a pre-determined threshold on a screening question, were fluent in English and did not have a diagnosed learning disability were invited to take part.

2.4 Materials

2.4.1 Screening

Consistent with previous studies with adults (e.g., Culver, Stoyanova, & Craske, 2012; Tsao & Craske, 2000), adolescents were asked to give a written response to two screening questions related to anxiety and avoidance of giving a speech. Questions were “How anxious would you feel giving a speech in front of people your age?” and “How likely are you to try

and avoid giving a speech in front of people your age?". Each question was rated on a 0 to 8 scale where 0 indicated "no anxiety"/"no avoidance" and 8 indicated "extreme anxiety"/ "extreme avoidance". However, following feedback from adolescents that their *actual* avoidance was low due to their perceived consequences of avoidance (e.g., getting in trouble with teachers, being embarrassed in front of peers and poor grades) we decided to drop this item from the screening. Therefore, adolescents who rated themselves as a 5 or higher for anxiety were considered for participation. All adolescents who attended the assemblies completed the screening questions, and then school staff confirmed eligibility criteria (see Recruitment) to ensure that those who were invited were suitable to participate.

2.4.2 Symptoms of Anxiety and Depression

The Revised Child Anxiety and Depression Scale (RCADS; Chorpita, Yim, Moffitt, Umemoto, & Francis, 2000), is a 47-item measure of anxiety and depression symptoms which assesses symptoms of Separation Anxiety Disorder, Social Anxiety Disorder, Generalised Anxiety Disorder, Panic Disorder, Obsessive Compulsive Disorder and Major Depressive Disorder. Responders rate how often each item applies on a scale of 0 ("never") to 3 ("always"). For this study, we used the total (anxiety and depression) scale, the anxiety subscale and the social anxiety subscale scores (Cronbach's alpha = .95 .94 and .83, respectively) to describe the sample. This scale has shown good psychometric properties in young people aged 7-18 years, within both non referred (Chorpita et al., 2000) and clinical populations (Chorpita, Moffitt, & Gray, 2005).

2.4.3 Exposure Stimulus

Prepared speeches were performed in front of a variety of pre-recorded classroom audience footage of similar aged peers recruited from a drama school and filmed within a school setting. These pre-recorded classroom audiences provided a controlled and practical exposure stimulus that could be administered within a school environment. The footage followed a similar procedure to the Leiden-Prepared Speech Task (PST; Westenberg et al., 2009), a task that elicits a moderate social-evaluative threat. Recording of the classroom audience footage (e.g., developing directions for actors) and the development of procedural instructions was developed in consultation with the Leiden research group.

The audience footage was filmed across two contexts:

i) a classroom including rows of tables, chairs and actors wearing standard school uniform (e.g., white shirt, trousers/skirt, school bag)

ii) an assembly hall including rows of chairs and actors wearing casual, non-uniform (e.g., jeans, jumper/t-shirt)

To decrease the likelihood of premature habituation and to maximise sensitivity of the dependent variables, we developed two different contexts for the assessment and exposure sessions. Five scenes were filmed for each context. Each scene included 14-16 actors, aged between 12-15 years, and a male teacher. Each scene began with an empty room. The audience entered the room, talking amongst themselves, after approximately 30 seconds. Once the audience were seated the teacher instructed "You can start now". Recording took place over four separate sessions. To ensure that the recordings reflected what might typically happen in a school environment, we showed a pilot recording to University students and used their feedback in subsequent recordings. The final recordings were discussed and edited in consultation with a local secondary school-based patient and public involvement group. To limit potential order effects, the order that recordings were shown in were counterbalanced across experimental conditions (see Figure 1 in Supplemental Material for a diagram of the audience counterbalancing procedure). Experimental conditions were equally assigned to the counterbalanced conditions in order to minimise differential responding between groups. No recordings within context were repeated.

2.4.4 Speech Topics

A range of topics were compiled to ensure that all participants would feel able to select enough topics of interest to speak about in the study. Examples of topics were school uniform, school subjects, mobile phones, and hobbies. Topics were transferred onto cards and a different set, containing different topics, was used for each session. We intentionally avoided emotive topics that may have influenced participants' level of arousal.

2.4.5 Outcome Measures (Assessment of Speech Anxiety)

Speech anxiety across all three groups was measured at pre-test (Session 1; speech 1), immediate post-test (Session 2; speech 8), and 1-week follow-up (Session 3; speech 9) (see Figure 2 in Supplemental Material for a diagram of anxiety assessment procedures).

2.4.5.1 Subjective Units of Distress (SUDS)

Participants provided a rating of their anxiety immediately prior to and following speeches that were delivered during the assessment phases, using a 0-10-point Likert scale, with 0 indicating "not anxious" and 10 indicating "extremely anxious".

2.4.5.2 Heart Rate

Physiological arousal was measured on the basis of heart rate recorded using a Polar Precision A360 Activity Tracker worn on the wrist of the participant's non-dominant hand. An activity tracker worn on the wrist offered an accurate (Rider et al., 2019), suitable, non-invasive apparatus to use with adolescents in a one-on-one situation within a school environment. The data transferred to the computer through the software Polar Flow Sync by means of an interface device with infrared emission signals. The data (beats per minute, per second) was transported from Polar Flow Sync to the Microsoft Excel software (Microsoft Office). Discrete one-minute timestamps were recorded throughout the experimental procedure to guide heart rate data extraction. Time stamps were recorded remotely by the experimenter. The mean beat per minute (BPM) was calculated for each 1-minute timepoint (i.e., immediately before and after each assessment speech).

2.4.5.3 Observer Ratings of Expressed Anxiety

A three-item instrument was developed for the purpose of the study to measure observer ratings of speech anxiety. The instrument followed a similar procedure to the child anxiety observational coding scale used by Murray et al (2012) and adapted for this age range by Waite & Creswell (2015). For this study, further adaptations were made following feedback from four young people (e.g., the inclusion of an "essential" and "additional" criteria and expansion to a seven-point rating scale to reduce ceiling effects) (see Table 1 in Supplemental Material).

The instrument assessed three anxiety domains:

i) General behaviour (e.g., appears eager to get away from the camera, reassurance seeking, conceals face, nervous laugh/coughing, pacing/rocking/swaying, gulping or deep/shallow breathing) assessed before and during each assessment speech
ii) Body movements (e.g., anxious facial expressions, mouthing/chewing, facial twitches/grimaces, eyes, frowned/raised eyebrows, flared nostrils, poor eye contact, posture, hand actions, crossed arms, shaking) assessed before and during each assessment speech
iii) Speech (e.g., hesitation/difficulty starting, uncomfortable tone/pace, stumbling/stuttering over words, long pauses, repeatedly saying 'um' or 'like') assessed during each assessment speech

The coding scale for each item ranged from 1 (no obvious signs of anxiety) to 7 (anxiety is pervasive and strong). Each 20 second epoch was rated separately prior to and during the

speech, and then a mean score was calculated for each domain at each timepoint. Video recordings of each assessment phase were coded by two undergraduate psychology students, blind to study conditions. Each coder completed a training phase and coders were required to be reliable at a kappa intraclass correlation of 0.7 or above after coding the same 30 videos. Coders then received ongoing supervision and attended weekly group meetings to review the coding and reduce coder drift. Inter-rater agreement showed good levels of agreement between raters for all codes: general behaviour (before speech): 0.73; body movements (before speech): 0.70; general behaviour (during speech): 0.70; body movements (during speech): 0.81; and speech related performance anxiety: 0.92. Where videos were double coded (i.e., for training/reliability purposes) the coding from the coder who rated the highest number of videos overall was included. The three domains (general behaviour, bodily manifestations and speech anxiety) did not correlate highly with each other (r=0.001-0.36) and so were analysed separately. Coders also recorded speech length in order to examine the amount of the 1-minute time allocation spent speaking.

2.4.6 Procedure

The study was reviewed by the School of Psychology and Clinical Language Sciences Ethics Committee at the University of Reading and permission for it to proceed was granted. Participants' caregivers were given written information about the study and provided written consent prior to the first session.

The procedure included three sessions within the school, away from the participants' scheduled lessons. In Session 1, participants were provided with initial study information before they gave written assent to take part and provided demographic information including age, gender, ethnicity and parent occupation (in order to ascertain socio-economic status). Participants then completed the RCADS (and other questionnaires not related to this study) in hard copy. Next, the heart rate tracker was secured to the participant's wrist on their non-dominant hand. A 1-minute baseline measure of heart rate was recorded while participants watched a (calm) nature video. Participants then completed the first assessment of speech anxiety, followed by four exposure trials. In Session 2, participants completed three exposure trials followed by the second assessment of speech anxiety. Session 3 involved the third assessment of speech anxiety. Where possible, Session 2 occurred the next school day after Session 1, and Session 3 occurred 7 days after Session 1, however, due to the naturalistic context in which the study was conducted this was not always possible. While there was little

variation in the number of days between assessments, Session 2 took place 1-4 days (M = 1.36) after Session 1, and Session 3 took place 6-10 days (M = 7.33) after Session 1.

2.4.7 Speech Task

Participants selected a speech topic at random from a variety of cards, face down on a desk. A range of speech topics were available and differed between sessions. Speech topics were randomly selected, however, the option to select another topic was provided if the participant did not feel they could talk about their chosen topic for 1 minute. Participants were instructed to make each speech last for 1 minute and were encouraged to share their thoughts, beliefs and opinions on the given topic. Participants were given 5 minutes to plan each speech. Consistent with previous studies (Westenberg et al., 2009), in order to create a condition of social-evaluative threat, participants were informed that their speeches would be recoded and evaluated by peers of the same age and a teacher from a different school in a different area. However, this was not the case and participants were told this in a debrief at the end of the study. Participants were aware that the pre-recorded audience was not live. Participants were given a sheet with prompts to help prepare the speech. After the five-minute preparation, participants were instructed to walk over and stand on a mat placed in front of a white screen. A pre-recorded classroom audience was projected on to the screen showing an empty classroom. The researcher moved to the back of the classroom and sat behind a screen to avoid distracting the participant during the speech task. Participants were instructed to begin their speech after the pre-recorded audience had entered the room, sat down, and they heard the teacher say “You can start”. If participants stopped talking before the allocated 1-minute, the researcher gave a prompt “Would you like to continue, or have you finished?” after 20 seconds of silence. After the speech, participants returned to the desk. Participants were instructed to “wait” for 3-minutes (recovery period). No other instructions were given during the recovery period. The same procedure was repeated during Session 2 and Session 3 although the choice of speech topics differed each time (see Figure 2 in Supplemental Material).

2.4.8 Exposure trials

At the start of Session 1, participants were randomly assigned, using a sealed envelope, to one of the three groups (AL, PCS or control). Although the optimal dose of exposure trials required in preclinical studies remains unclear, there is evidence from fear conditioning and extinction studies for successful extinction effects have been observed after 6-8 trials of conditioned stimuli in adolescents (Fairchild, Van Goozen, Stollery, & Goodyer, 2008; McGuire et al., 2016; McLaughlin et al., 2016). Therefore, a total of 7 exposure (plus

verbalisation strategy) trials were conducted between Session 1 - 2 (Session 1 = 4 trials, Session 2 = 3 trials). The same procedure was used for all 7 exposure (1-minute speech) trials (see Figure 3 in Supplemental Material for a diagram of the exposure procedure across experimental conditions). After each speech, participants were instructed to sit down for a 90-second inter-trial interval. Speech topics were selected using the same procedure used during the speech anxiety assessment.

2.4.9 Verbalisation strategies

2.4.9.1 Affect Labelling (AL)

The AL procedure was based on Niles et al. (2015), with some modifications. In the current study, prior to each speech, participants in the AL condition were instructed to label their emotions and feared outcome using words from a selection presented on individual cards. Participants were given a paper slip with the phrase "I feel____. I think the other people will____". Examples of emotion words were "anxious", "embarrassed" and "stupid". Examples of feared outcome phrases were "think that I look ridiculous", "think that I'm not good enough" and "laugh at my speech". The response options were developed with a group of adolescents in the study age range to make sure they were age appropriate. Participants wrote down their emotions and feared outcomes on the slip of paper provided, confirmed this with the researcher, walked over to the red mat and read the slip out loud (immediately before the pre-recorded classroom audience was projected onto the white screen). Following Niles et al. (2015), prior to each speech, participants were prompted by a computer to choose words to label their emotions and words to label their feared outcome from four options presented on the screen.

2.4.9.2 Positive Coping Statements (PCS)

The PCS condition followed a similar procedure. Prior to each speech, participants were instructed to create a positive sentence using positive words and outcomes to help them to feel less worried. Participants were given a paper slip with the phrase "It will be___ because____". Examples of positive words were "rewarding", "useful" and "enjoyable". Examples of positive outcomes were "other people might learn something new", "my speech is planned" and "people might like my speech". Again, the response options were developed with a group of adolescents in the study age range. Participants wrote down their positive sentence on the slip of paper provided, confirmed this with the researcher, walked over to the red mat and read the slip out

loud (immediately before the pre-recorded classroom audience was projected onto the white screen).

2.4.9.3 Neutral Statements (Control)

Prior to each speech, participants in the control condition were asked to come up with and say a neutral sentence and were given a paper slip with the phrase "The time is____ my speech will be about____". Participants wrote down the time and the topic of their speech on the slip of paper provided, confirmed this with the researcher, walked over to the red mat and read the slip out loud (immediately before the pre-recorded classroom audience was projected onto the white screen).

Completed sentences were inspected by the experimenter to ensure alignment with the group instructions. All responses were in line with instructions and none of the participants' sentences required revision. Word use was recorded and coded and the linguistic content for each experimental condition was examined. Three categories emerged including anxiety (e.g., "worried", "scared", "anxious"), shame (e.g., "ashamed", "embarrassed", "foolish") and other (e.g., "stressed", "confused", "concerned"). The linguistic content was coded by two raters (the author (HP) and a post-doctoral researcher). Inter-rater agreement showed high levels of agreement between the raters (k = .79).

2.4.10 Debrief

At the end of the study, participants received a full study debrief from the researcher and were informed that the speech footage would only be viewed by members of the research team for the purpose of analysis. Participants were asked not to share details of the study with peers until the study was complete to ensure that the necessary deception was preserved. Participants who completed the study were enrolled into a prize draw to win one of three £50 vouchers.

2.4.11 Power Analysis

The sample size was informed by a previous study of exposure with affect labelling for adults with public speaking anxiety (Niles et al., 2015). For heart rate during recovery, Niles et al.(2015) reported a significant group x time interaction from post-test to 1-week follow-up with an effect size of d = 0.33 and this was considered to be clinically meaningful. For the current study, the results of a G*Power calculation suggested that to achieve power of 0.8, for a repeated measures, within-between analysis of variance (ANOVA) effect size of 0.3, the sample required would be 79. To achieve equal group sizes, we aimed to recruit 81 participants.

2.4.12 Data Analysis

SPSS 24.0 for Windows (UK) was used for statistical analysis. Multiple imputation, is a valid method for handling missing data and was used to replace missing values (Enders, 2017). Experimental groups were compared on baseline characteristics and clinical characteristics (age, gender, ethnicity, SES) and pre-test outcome measures (SUDS, heart rate observer ratings of anxiety) using one-way ANOVA/ Pearson's chi-squared ($\chi 2$) test as appropriate. To assess experimental outcomes, data were analysed using a 3 (group; AL, PCS and control) by 3 (time: pre-test, immediate post-test and 1-week follow-up) within-between (mixed) ANOVA with assessment time-points as a repeated-measure variable (heart rate: 1-minute anticipation and recovery from speech; SUDS: immediately prior to and after the speech; observer ratings of expressed anxiety: 1-minute anticipation and during the speech). A two-tailed test with a p value of < 0.05 was considered statistically significant. Partial eta squared ($\eta_p 2$) was calculated to examine the magnitude of the significant time by condition interactions (small effect = 0.01; medium effect = 0.06; and large effect = 0.14) (Cohen, 1988) and Cohen's *d* was used to examine the magnitude of experimental effects between groups. Post-hoc contrast analysis was used to explore statistically significant group x time interactions. All data in this study are presented as the mean ± standard deviation.

3. Results

3.1 Baseline Group Differences

Demographic information is presented in Table 1. Participants in the three conditions did not differ significantly at baseline or Pre-test on any of the demographic, clinical or outcome variables.

3.2 Word Use

For the AL condition, 78% of emotion labels were anxiety related (e.g., worried, nervous, anxious), 11% were shame related (e.g., ashamed, embarrassed, foolish), and 11% were 'other' (e.g., uneasy, stressed, uptight). No emotion labels were used in the PCS or Control conditions.

Hypothesis Testing

The means and standard deviations for all dependent measures by Group over Time are presented in Table 2.

3.3 SUDS

Before speech

For pre-speech SUDS ratings, there was a significant change between times ($F(2,156) = 35.6$, $p < .001$, $\eta_p^2 = .31$), with a large effect, reflecting a significant decrease from pre-test to immediate post-test (M = 1.64, 95% CI [1.03 - 2.26], $p < .001$) and from pre-test to 1-week follow-up (M = 1.72, 95% CI [1.14 – 2.29], $p < .001$), but not from immediate post-test to 1-week follow-up (M = .07, 95% CI [-.42 - .56], $p = 1.0$), indicating that SUDs reduced from pre to post and then remained relatively stable to the 1 week follow-up. There was a small, non-significant group x time interaction ($F(2, 78) = 1.3$, $p = .35$, $\eta_p^2 = .03$) when all assessment timepoints were included.

After speech

A similar pattern was found for post speech SUDS ratings, there was a significant change between times ($F(2, 156) = 46.27$, $p < .001$, $\eta_p^2 = .37$) with a large effect, reflecting a significant decrease from pre-test to immediate post-test (M = 2.10, 95% CI [1.47 – 2.73], $p < .001$) and from pre-test to 1-week follow-up (M = 2.04, 95% CI [1.43 – 2.65], $p < .001$), but not from immediate post-test to 1-week follow-up (M = -.06, 95% CI [-.64 - .52], $p = 1.0$).

For post speech SUDS there was a significant group x time interaction ($F(2, 155) = 2.89$, $p = .03$, $\eta_p^2 = .07$) with a medium effect. Simple contrast analysis with a Bonferroni adjustment showed that participants in the PCS group reported a significantly greater reduction in SUDS from pre-test to immediate post-test compared to both the AL ($t(52) = -2.70$, $p = 0.1$, $\eta_p^2 = .09$) and Control ($t(52)$, $= -2.29$, $p = 0.2$, $\eta_p^2 = .06$) groups, both with medium effects, but the reverse pattern was observed later, that is, there was a significant increase in SUDS in the PCS group from immediate post-test to 1-week follow-up compared to the other groups; PCS vs AL ($t(52) = 2.88$, $p = .01$, $\eta_p^2 = .10$); PCS vs Control ($t(52) = 1.98$, $p = .05$, $\eta_p^2 = .05$), with large and medium effects respectively (see Figure 2). However, the PCS group did not differ significantly from the AL ($t(52) = -.06$, $p = .95$, $\eta_p^2 = .00$) or the Control ($t(52) = -.48$, $p = .63$, $\eta_p^2 = .00$) groups from pre-test to 1-week follow-up. The AL and Control groups did not differ significantly from one another from pre-test to immediate post-test ($t(52) = -.41$, $p = .68$, $\eta_p^2 = 00$), immediate post-test to 1-week follow-up ($t(52) = .89$, $p = .37$, $\eta_p^2 = .01$) or pre-test to 1-week follow-up ($t(52) = .42$, $p = .67$, $\eta_p^2 = 00$) (see Table 2).

3.4 Heart Rate

There were no significant main effects or interactions based on measures of heart rate before or after the speech (all *ps* > .05) (see Table 2 and Table 3)[1].

3.5 Observer Ratings of Expressed Anxiety

Before speech

For general behaviour before the speech, there was a small non-significant change over time ($F(2,156) = 3.12$, $p = .05$, $\eta_p^2 = .04$) and group x time interaction ($F(4,156) = .26$, $p = .90$, $\eta_p^2 = .01$) when all assessment timepoints were included.

For body movement before the speech, there was no significant change between times ($F(2,156) = .23$, $p = .79$, $\eta_p^2 = .00$) and no significant group x time interaction ($F(4,156) = .26$, $p = .90$, $\eta_p^2 = .00$) when all assessment timepoints were included. During speech

For general behaviour before the speech task, there was no significant change between times ($F(2,156) = .10$, $p = 0.91$, $\eta_p^2 = .00$) and a small, non-significant group x time interaction ($F(4,156) = .69$, $p = .60$, $\eta_p^2 = .02$). The same was true for body movement before the speech, i.e., there was no significant change over time ($F(2,156) = .04$, $p = .96$, $\eta_p^2 = .00$) and a small, non-significant group x time interaction ($F(4,156) = 1.23$, $p = .29$, $\eta_p^2 = .03$) when all assessment timepoints were included.

For speech related performance anxiety during the speech task, there was a significant change between times ($F(2, 156) = 5.54$, $p = .005$, $\eta_p^2 = .07$), with a medium effect. Speech related performance anxiety reduced from pre-test (M = 2.98, SD = .96), to immediate post-test (M = 2.64, SD = .91), and to 1-week follow-up (M = 2.63, SD = .99). Contrast analysis with a Bonferroni adjustment revealed that speech related performance anxiety significantly decreased from pre-test to immediate post-test (M = .33, 95% CI [.02 - .64], $p = .03$) and from pre-test to 1-week follow-up (M = .34, 95% CI [.50 – .64], $p = .02$), but not from immediate post-test to 1-week follow-up (M = .01, 95% CI [-.24 - .26], $p = 1.0$). There was a small, non-significant group x time interaction ($F(4,156) = .21$, $p = .93$, $\eta_p^2 = .01$) when all assessment timepoints were included.

For the amount of time spent speaking, there was a significant change between assessments ($F(2, 156) = 4.48$, $p = .02$, $\eta_p^2 = .05$), with a medium effect. The time spent speaking reduced

[1] Further analysis found no significant main effects ($F(2, 154) = .07$, $p = .93$) or interactions ($F(4, 154) = .39$, $p = .81$) during the recovery period when the additional 2 minutes of recovery heart rate data were also examined.

from pre-test (M = 47.01, SD = 13.34) to immediate post-test (M = 44.90, SD = 13.06), and to 1-week follow-up (M = 43.64, SD = 13.33). Contrast analysis with a Bonferroni adjustment revealed that the amount of time spent speaking significantly decreased from pre-test to 1-week follow-up (M = 3.37, 95% CI [.34 – 6.40), p = .02), but not from pre-test to immediate post-test (M = 2.11, 95% CI [-.91 – 5.13], p = .27) or immediate post-test to 1-week follow-up (M = 1.26, 95% CI [-1.35 – 3.87], p = .72). There was small, non-significant group x time interaction (F(4,156) = .46, p = .77, η_p^2 = .01) when all assessment timepoints were included.

4. Discussion

This study explored the effect of adding different verbalisation strategies (affect labelling and positive coping statements, compared to neutral statements) to exposure for public speaking anxiety in adolescents. Overall, we found that SUDS reduced over the course of the exposure protocol, but heart rate and observer-ratings of expressed anxiety did not. In contrast to our hypotheses, affect labelling did not enhance the effectiveness of exposure in that there were no significant differences between the groups from pre-test to 1-week follow-up on measures of self-rated anxiety, heart rate, or observer ratings of expressed anxiety. For post-speech self-reported SUDS ratings, there was an initial advantage of exposure with positive coping statements, however this effect was not maintained, and at the 1-week follow-up, the reverse pattern was seen, with a significant increase in SUDS in this condition from post-test to 1-week follow-up compared to exposure with affect labelling or neutral statements.

The reduction in SUDS over the course of the exposure protocol was consistent with studies of adult participants (Kircanski et al 2012; Niles et al, 2015). For heart rate, our results were consistent with Niles et al. in that there was not a reduction in heart rate over time. No other studies have examined changes in observer-rated expressed anxiety.

While the lack of significant findings relating to affect labelling and self-reported SUDS ratings was consistent with studies on adults (Kircanski et al., 2012; Niles et al., 2015), our lack of significant findings for heart rate was inconsistent with the significant (but small) effects seen in adults (Niles et al., 2015). Notably, for those in the positive coping statements condition, there was an initial (and significant) reduction in fear, followed by a partial return of fear, over the duration of the study, which may indicate that immediate advantages of positive coping statements diminish over time. While there were differences between the groups on baseline SUDS were small (ηp^2 = .05) and nonsignificant, the baseline scores were

somewhat higher among the positive coping statements group and the possibility which may have allowed for a steeper decline in scores due to regression to the mean. This finding, in combination with the subsequent uplift in scores at 1-week follow-up, highlight the lack of evidence that positive coping statements are an effective strategy to enhance exposure for adolescents. Further studies with longer-term follow-up assessments are now warranted to replicate and extend these intriguing findings.

The finding that the use of positive coping statements appeared to bring short term benefits may explain its common application within treatments for anxiety disorders in young people. However, the finding that it ultimately did not facilitate exposure adds to evidence suggesting that anxiety management strategies may not ultimately improve outcomes in young people with anxiety disorders (Whiteside et al., 2015). It is also consistent with Kircanski et al.'s (2012) finding in adults with spider fears that reframing negative stimuli before exposure did not generate significant benefits in the longer term. Anxiety management strategies have long been thought to be important for engagement and tolerability, making exposure exercises more acceptable and increasing "buy-in", especially for younger populations (Butler & et al, 1984; Kendall et al., 2005; Manassis, Russell, & Newton, 2010). However, notably there were equivalent (low) dropout ratings between the groups in the present study. Similarly, Whiteside et al.'s (2015) study involving young people with anxiety disorders found high (85%) and identical retention rates between treatment conditions with and without anxiety management, suggesting that positive reframing may not be a necessary precursor to engagement with exposure. Given the need to increase access to psychological therapies for young people with anxiety disorders (Green, McGinnity, Meltzer, Ford, & Goodman, 2009; Lawrence et al., 2015; Merikangas et al., 2011), understanding what components of treatment are not necessary is an important step towards making interventions more efficient.

This study was designed using a theoretical approach driven by inhibitory learning principles and is the first study to address the effectiveness of exposure with affect labelling and positive coping statements in adolescents. It examines exposure in a fear that is commonly reported in adolescents, using an experimental paradigm conducted in highly controlled conditions in a naturalistic setting and involving a speech task that successfully generated a moderate level of anxiety in participants.

Several limitations which may have reduced experimental effects and generalisability of findings are noted. In order to maximise the opportunity for speaking (i.e., so that we could be

confident that any interruptions to speech were due to fear/anxiety rather than running out of things to say), participants were given the option to select another topic if they did not feel they could talk about their chosen topic for 1-minute. Topics were selected to be fairly broad (e.g., mobile phones, school uniform, animals) however, inevitably, some adolescents may not have felt interested or able to talk about a given subject. In these instances, participants were given the option to select another topic. While improvements in fear responding were found across all conditions, the study did not include a no-exposure condition, therefore we cannot confidently conclude that changes were driven by exposure. Furthermore, we deliberately set out to prevent participants in the control condition from internally verbalising their affect or using positive coping statements through the use of neutral statements. However, this may have interfered with the exposure by acting as a distraction. Future studies may benefit from an exposure-alone condition. Due to the practical constraints of conducting the sessions in the school environment and having to fit within the school timetable, our study included less exposure trials than the adult studies (seven versus twenty trials in the adult studies; i.e., Kircanski et al., 2012; Niles et al., 2015) which may account for inconsistent outcomes. It should also be noted that school/classroom factors were not taken into account in the analyses. Furthermore, due to practical constraints within schools, there was some variation in the duration between assessments however the time between assessments did not differ significantly between study conditions and no significant associations between number of days between sessions and dependent variables were found.

We anticipated that seven exposure trials would be sufficient given previous evidence to suggest that successful extinction effects can occur after 6-8 trials of conditioned stimuli in adolescents (Fairchild et al., 2008; McGuire et al., 2016; McLaughlin et al., 2016). It is possible, however, that adolescents require a greater number of exposure trials to elicit experimental effects than used in the current study. In line with Niles et al. (2015), we recorded a 1-minute baseline for heart rate recording however it is possible that there may have been benefits from having a longer baseline period. In addition, unlike Niles et al., (2015), the study did not include a questionnaire measure of public speaking anxiety (e.g., Personal Report of Public Speaking Anxiety; McCroskey, 1970). Although we used different contexts/scenes to decrease the likelihood of premature habituation, we were not able to replicate what would typically occur in clinical treatment, where exposures tend to increase in difficulty over time (e.g., Benjamin et al., 2010). By having a pre-recorded (rather than the live audiences used by Niles et al., (2015) in their research with adults), we were able to standardise the experimental

conditions, however adolescents were not afforded the opportunity to learn that the feared outcome (e.g., audience laughing at speech) did not occur, which may further account for the inconsistent outcomes. While it is possible that procedural factors (e.g., overlap in context from Day 1 exposure to immediate post-test) may have influenced responding, we were reassured that there were no consistent effects of counterbalancing condition on the dependent variables. While the pre-recorded audience replicated a public speaking procedure that has been shown to elicit a social evaluative threat and moderate level of anxiety (Westenberg et al., 2009), the comparability of findings to studies involving a live audience (i.e., Niles et al, 2015) is not clear. Although participants were asked not to share details of the study with peers until the study was complete (to ensure that the necessary deception was preserved), there was no assessment of whether participants believed that their speeches would be shown to peers and a teacher from a different area. The current study measured physiological arousal using an activity tracker worn on the wrist as this was non-invasive and suitable to use with adolescents in a one-to-one situation within a school environment. However, a physiological measure recommended for fear conditioning and extinction research with children and young people (e.g., skin conductance response) may have been more sensitive to experimental effects (Ryan, Zimmer-Gembeck, Neumann, & Waters, 2019). While it is not clear why the amount of time spent speaking significantly decreased from pre-test to 1-week follow-up, this may reflect that the participants felt less concerned about reaching the 1-minute allocated speech time as anxiety reduced and they became more familiar with experimental procedures/the researcher. Finally, participants were identified based on having high levels of performance anxiety, however they were not a clinical sample and scored substantially below the clinical cut off for symptoms of overall anxiety and social anxiety.

To conclude, the current study explored the effect of adding affect labelling, positive coping statements and neutral statements to exposure for public speaking anxiety in adolescents. Although initial reductions in speech anxiety were seen among those adolescents who generated positive coping statements, these reductions appeared to diminish over the course of the following week, by which time there were no significant differences between the groups on measures of self-rated anxiety, heart rate, and observer ratings of expressed anxiety. This study demonstrated the possibility of conducting innovative experimental research with young people. Further research should now build on this to explore the applicability of a wider range of optimisation strategies identified with adults (e.g., Craske, Hermans, & Vervliet, 2018;

Craske et al., 2008, 2014), taking into account different developmental periods, types of anxiety symptoms/disorders and severity.

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6. Figures

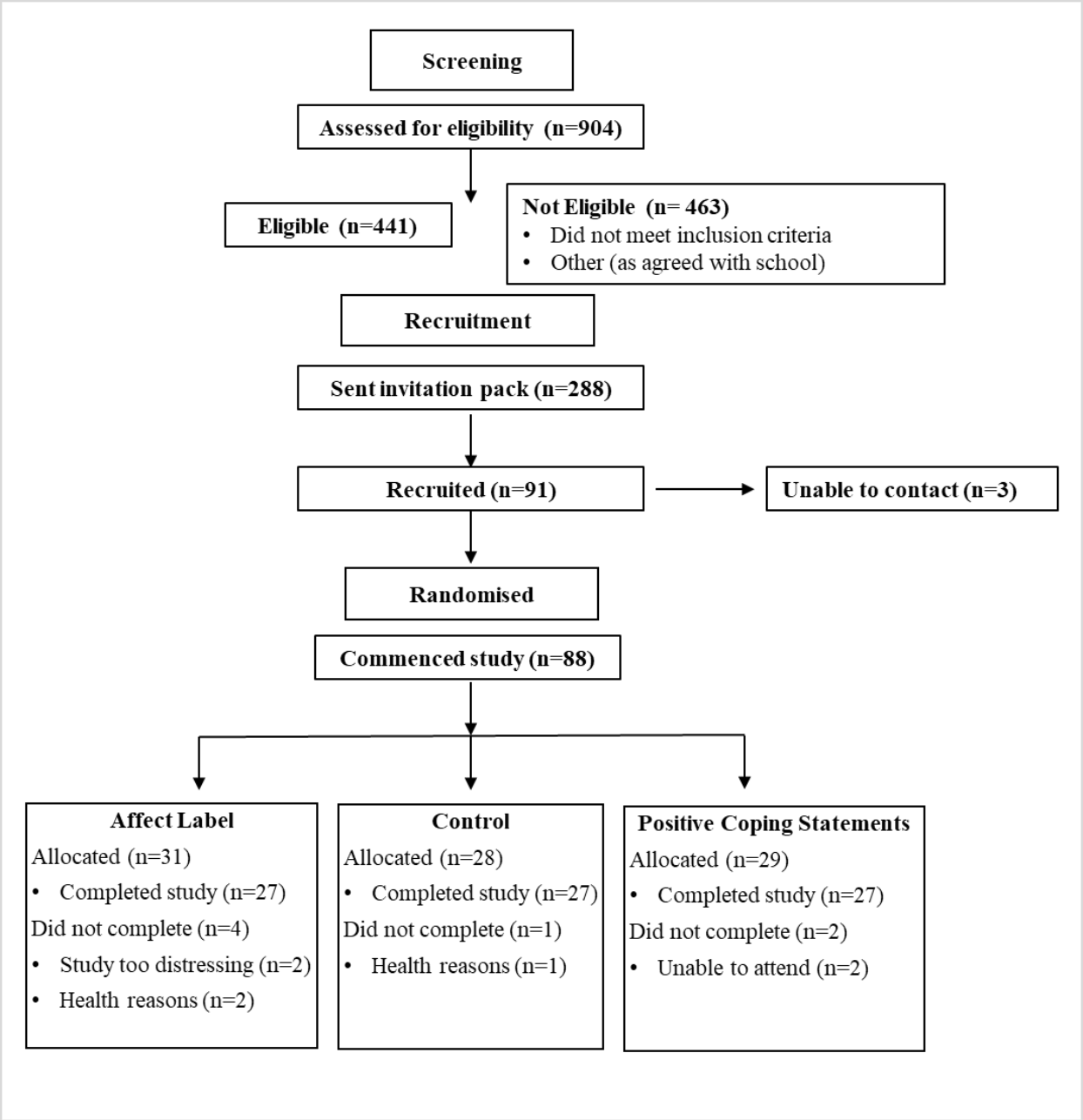

Figure 1. Participant flow chart[2]

[2] Two participants randomised to the affect labelling condition dropped out early in the in the study due to the study being too distressing. One participant dropped out after completing the Pre-Test (prior to receiving affect labelling specific instructions) and another dropped out after completing the first affect labelling exposure trial. Given that both participants dropped out during the initial speech phase of the study, their data were not included in subsequent analysis.

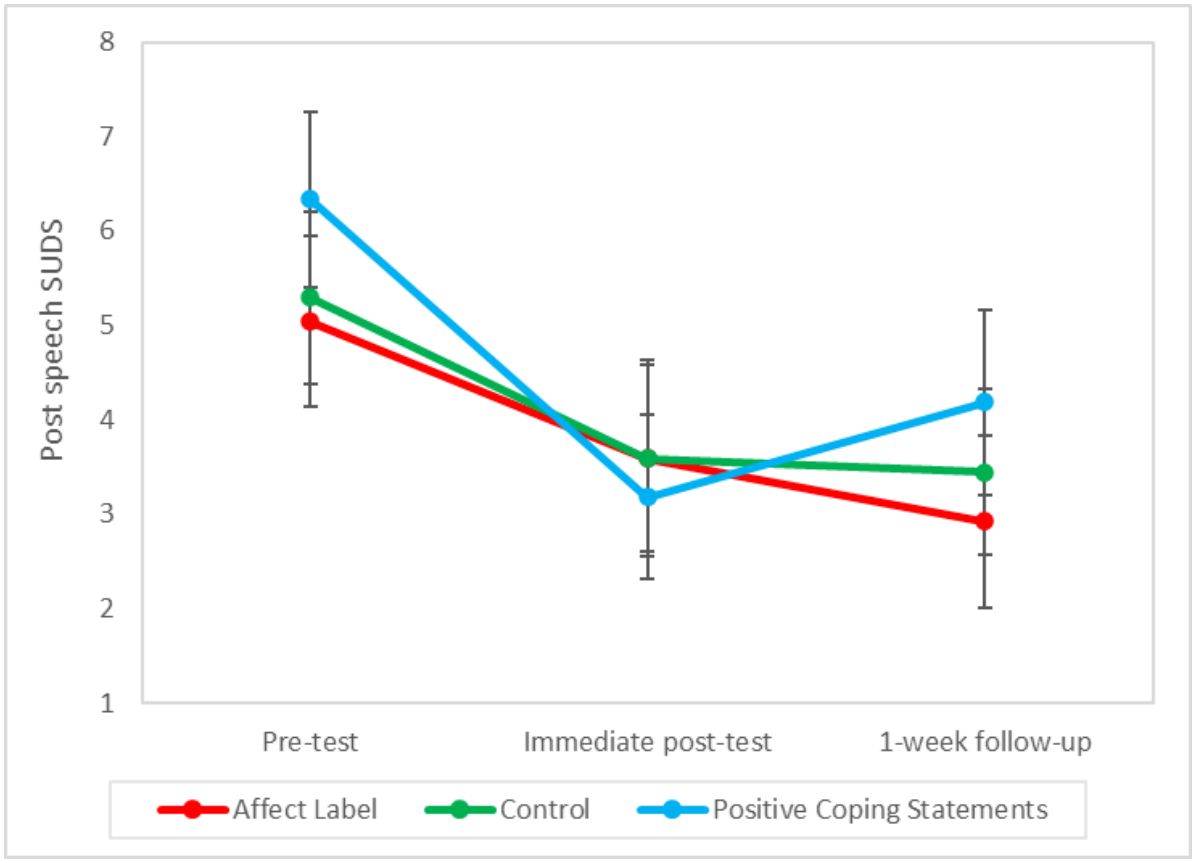

Figure 2. Effect of experimental condition on SUDS after the speech task

7. Tables

Table 1. Sample demographics, scores on screening measure and baseline and anxiety symptoms

	Overall Sample (n=81)▪	**Affect Label** (n=27)▪	**Control** (n=27)▪	**Positive Coping Statements** (n=27)▪	**Between Conditions**	
					χ^2	***P***
Gender (%)						
Male	25.7	22.2	25.9	25.9	.13	.94[a]
Female	75.3	77.8	74.1	74.1		
SES (% professional)	49	68	54.2	43.5	2.95	.23[a]
Ethnicity (%)						
White British[b]	63	-	-	-	-	-
School (%)						
1	28.4	33.3	25.9	25.9	3.61	.73
2	21.0	11.1	25.9	25.9		
3	42.0	44.4	44.4	37.0		
4	8.6	11.1	3.7	11.1		
	Mean (SD)				***F***	***P***
Age	14.09 (.55)	14.0 (.44)	14.2 (.73)	14.1 (.47)	.72	.49[c]
Performance Anxiety (0-8)	6.61 (1.05)	6.30 (0.91)	6.85 (0.99)	6.67 (1.18)	2.03	.14[c]
RCADS total	50.19 (21.25)	52.67 (27.30)	50.52 (19.26)	47.37 (16.05)	.42	.66 [c]
RCADS anxiety	41.36 (17.12)	44.18 (21.81)	41.04 (15.73)	38.85 (12.81)	.66	.52[c]
RCADS social anxiety	15.78 (5.20)	15.96 (5.96)	15.93 (5.09)	15.44 (4.64)	.08	.92[c]

Note. SES = socioeconomic scale; RCADS = The Revised Children's Anxiety and Depression Scale; ▪ Study completers, [a] χ2 test; [b] Schools provided ethnicity data in an anonymised format, therefore it was not possible to compare ethnicity between groups; [c] Analysis of variance.

Table 2. Mean raw scores by group and across assessment timepoints for dependent variables

	Affect Label (n=27)			**Control (n-=27)**			**Positive Coping Statements (n=27)**		
	Pre-Test (Session 1)	Immediate Post-Test (Session 2)	1-week Follow-Up (Session 3)	Pre-Test (Session 1)	Immediate Post-Test (Session 2)	1-week Follow-Up (Session 3)	Pre-Test (Session 1)	Immediate Post-Test (Session 2)	1-week Follow-Up (Session 3)
	Mean (SD)								
Heart Rate									
Baseline	81.8 (11.9)	-	-	77.1 (9.9)	-	-	76.1 (8.7)	-	-
Before speech	97.1 (10.7)	93.9 (12.7)	96.9 (11.0)	94.2 (11.2)	92.6 (9.2)	95.2 (9.5)	94.4 (11.3)	92.9 (9.4)	95.3 (12.2)
After speech	93.3 (14.4)	90.9 (11.2)	90.2 (9.4)	88.9 (11.3)	87.2 (9.2)	92.2 (8.8)	87.8 (10.0)	84.8 (10.2)	88.9 (9.7)
SUDS									
Before speech	5.52 (1.09)	4.04 (2.10)	3.48 (1.74)	5.41 (2.02)	4.07 (2.11)	4.19 (1.71)	6.19 (1.78)	4.07 (1.90)	4.30 (1.70)
After speech	5.04 (2.33)	3.59 (2.69)	2.93 (2.35)	5.30 (2.35)	3.59 (2.55)	3.44 (2.26)	6.33 (2.39)	3.19 (2.23)	4.19 (2.51)
Observer Ratings									
Before speech									
General behaviour	2.65 (0.57) [a]	2.65 (0.60)	2.38 (0.73) [a]	2.51 (0.77)	2.68 (0.72)	2.47 (0.71)	2.40 (0.66) [a]	2.52 (0.77)	2.25 (0.83) [a]
Body movement	4.12 (1.02) [a]	4.02 (1.16)	4.16 (0.84) [a]	4.05 (1.02)	3.96 (0.72)	3.93 (0.85)	3.84 (0.73) [a]	3.85 (0.85)	3.99 (0.87) [a]
During speech									
General behaviour	2.39 (0.88) [a]	2.77 (0.69)	2.64 (0.78) [a]	2.36 (0.96)	2.24 (1.07)	2.30 (0.72)	2.35 (0.64) [a]	2.35 (0.72)	2.27 (0.97) [a]
Body movement	3.62 (0.96) [a]	3.78 (0.96)	3.84 (0.81) [a]	3.95 (0.65)	3.92 (0.75)	3.63 (0.78)	3.66 (0.65) [a]	3.46 (1.01)	3.66 (1.06) [a]

Speech Related Performance Anxiety	2.94 (0.98) [a]	2.72 (1.12)	2.62 (1.18) [a]	2.96 (1.13)	2.65 (0.83)	2.62 (0.95)	3.03 (0.79) [a]	2.56 (0.78)	2.65 (0.83) [a]
Time Spent Speaking	43.59 (14.16) [a]	39.70 (13.23)	39.48 (14.01) [a]	48.44 (13.37)	46.04 (12.51)	45.04 (13.40)	49.0 (12.26) [a]	48.96 (12.13)	43.64 (13.33) [a]

Note. [a] Multiple imputation used to replace missing data. Data was missing (1.4%) for Observer Ratings of Expressed Anxiety only.

Table 3. Main Effects (time) and Interactions (time by group)

Comparison	Main Effect (Session)			Interaction (Session x Group)		
	Value		Effect Size	Value		Effect Size
	F	P	η_p^2	F	P	η_p^2
Heart Rate						
Before speech	2.43	.91	.03	.10	.98	.00
After speech [a]	.97	.49	.01	1.55	.12	.04
SUDS						
Before speech	35.6	< .001	.31	1.3	.35	.03
After speech	46.27	< .001	.37	2.89	.03	.07
Observer Ratings						
Before speech						
General Behaviour	3.12	.05	.04	.26	.90	.01
Body Movement	.23	.79	.00	.26	.90	.00
During speech						
General Behaviour	.10	.91	.00	.69	.60	.02
Body Movement	.04	.96	.00	1.23	.29	.03
Speech Related Performance Anxiety	5.54	.005	.07	.21	.93	.01

Note. [a] Mauchly's test indicated that the assumption of sphericity had been violated ($\chi 2$ (2) 13.4, p = .001); degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity (ε = .86).

8. Supplementary Material

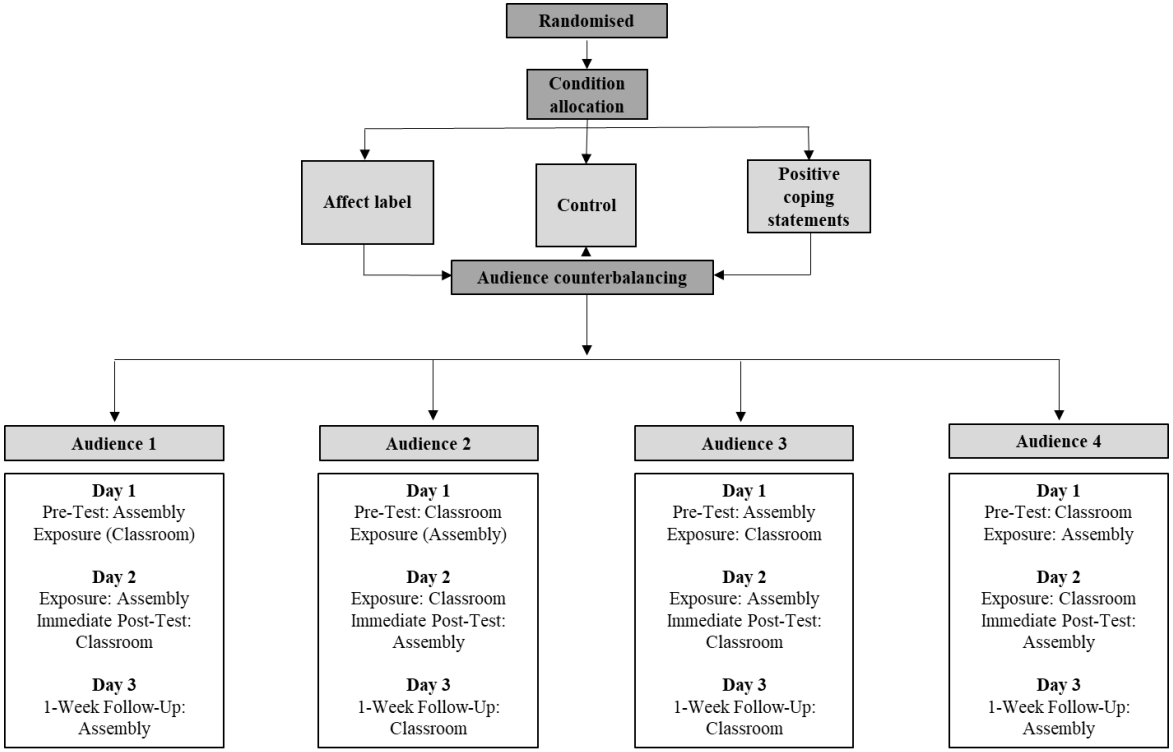

Figure 1. Audience counterbalancing[3]

[3] To decrease the likelihood of premature habituation, the audience context for pre-test to exposure (Day 1) and exposure to immediate post-test (Day 2) were different. Subsequently, there was an overlap in context from Day 1 exposure to immediate post-test and from pre-test to Day 2 exposure. We were reassured that for post-speech SUDS, heart rate and observer ratings of expressed anxiety, there were no significant counterbalancing condition x time interactions (*ps* = .23 to .92). However for pre speech SUDS the counterbalancing condition x time interaction was close to significance, ($F(6, 154)$, 1.68, $p = .13$, $\eta p^2 = .06$, with a medium effect. Further analysis showed that participants allocated to Audience 1 reported significantly higher pre-speech SUDS ratings at immediate post-test (M = 5.45, SD = 2.02), compared to Audience 2 (M = 3.70, SD = 1.72), Audience 3 (M = 3.48, SD = 2.29) and Audience 4 (M = 3.65, SD = 1.35) (*ps* = .01 to .03), all with a large effect (*ds* = .91 to 1.04). The fact that participants allocated Audience 1 and 3 received the same exposures at this point in the procedure suggests that this difference was not due to the audience allocation. Furthermore, no significant audience allocation differences were found at pre-test ($p = .79$) or one-week follow-up ($p = .17$)

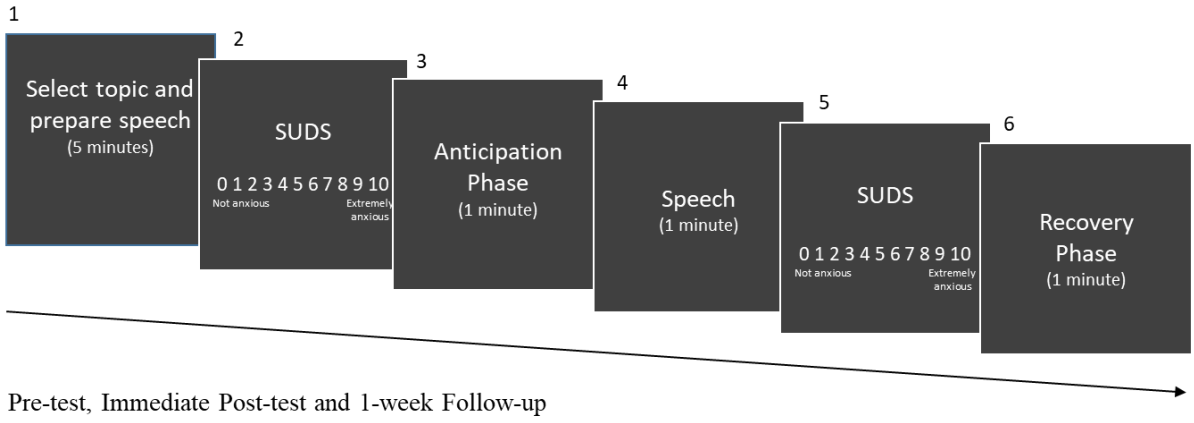

Figure 2. Speech anxiety assessment

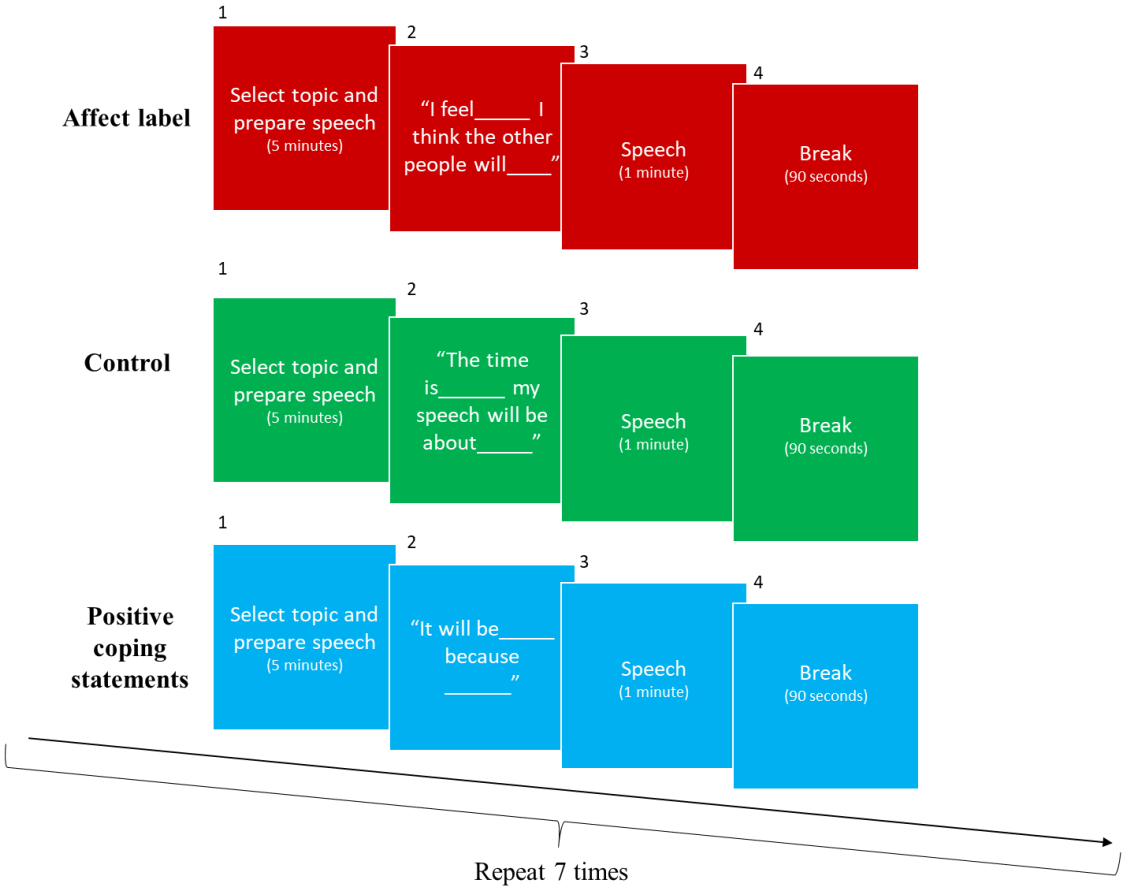

Figure 3. Exposure task by experimental condition

Table 1. Observer Ratings of Speech Anxiety; Child Anxiety Scale

Child anxiety scale (1-7) – Code every 20 seconds			
	ESSENTIAL		**ADDITIONAL**
1	The adolescent shows no obvious signs of anxiety. Overall, they seem relaxed and confident.		The talk will be delivered well. The adolescent shows one or more clear sign[s] that they are feeling confident and relaxed.
2	The adolescent seems anxious in a small way – one or more mild signs of anxiety.		Although the talk will be delivered well, the adolescent may only show mild signs that they are feeling confident.
3	The adolescent seems somewhat anxious - 1 clear sign of anxiety/shyness.		Overall the talk will be delivered adequately and the adolescent may show some minor signs that they are feeling confident. There may also be some brief/mild indication[s] of anxiety.
4	The adolescent seems moderately anxious - 2 clear signs of anxiety/shyness.		Although the talk will be delivered adequately, the adolescent will seem somewhat reluctant to do it. They may appear uncomfortable for more than just a brief episode.
5	The adolescent seems anxious for more than half of the time and shows 3 clear signs of anxiety/shyness.		Although some of the talk will be delivered adequately, the adolescent will seem clearly reluctant to do it. They are likely to appear uncomfortable for at least half of the time.
6	The adolescent seems anxious for most of the time. They will show more than 3 different, clear signs of anxiety/shyness.		Most of the talk will not be delivered adequately. The adolescent will clearly be reluctant to do the talk and likely to appear uncomfortable for most of the time.
7	The adolescent's anxiety is pervasive and strong for most of or the entire talk. The adolescent does not appear confident or relaxed at any point.		The adolescent will show clear signs of distress. The adolescent may be quiet for most of the talk, which may be ≤ 10 seconds in duration.