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Junwen Chen, Jordan E. McLean, Eva Kemps

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Junwen Chen *, Jordan E. McLean, and Eva Kemps

Author note:

Dr Junwen Chen, School of Psychology, The Flinders University of South Australia, GPO Box 2100 Adelaide, SA 5001, Australia. Tel: +618 8201 2601; fax: +618 8201 3877. E-mail address: junwen.chen@flinders.edu.au

Ms. Jordan E. McLean, School of Psychology, The Flinders University of South Australia, GPO Box 2100 Adelaide, SA 5001, Australia. Tel: +618 8201 2601; fax: +618 8201 3877. E-mail address: jordan.mclean@flinders.edu.au

Professor Eva Kemps, School of Psychology, The Flinders University of South Australia, GPO Box 2100 Adelaide, SA 5001, Australia. Tel: +618 8201 2416; fax: +618 8201 3877. E-mail address: eva.kemps@flinders.edu.au

*Corresponding author.

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Abstract

This study investigated the effects of combined audience feedback with video feedback plus cognitive preparation, and cognitive review (enabling deeper processing of feedback) on state anxiety and self-perceptions including perception of performance and perceived probability of negative evaluation in socially anxious individuals during a speech performance. One hundred and forty socially anxious students were randomly assigned to four conditions, namely Cognitive Preparation + Video Feedback + Audience Feedback + Cognitive Review (CP+VF+AF+CR), Cognitive Preparation + Video Feedback + Cognitive Review (CP+VF+CR), Cognitive Preparation + Video Feedback only (CP+VF), and Control. They were asked to deliver two impromptu speeches that were evaluated by confederates. Participants' levels of anxiety and self-perceptions pertaining to the speech task were assessed before and after feedback, and after the second speech. Compared to participants in the other conditions, participants in the CP+VF+AF+CR condition reported a significant decrease in their state anxiety and perceived probability of negative evaluation scores, and a significant increase in their positive perception of speech performance from before to after the feedback. These effects generalised to the second speech. Our results suggest that adding audience feedback to video feedback plus cognitive preparation and cognitive review may improve the effects of existing video feedback procedures in reducing anxiety symptoms and distorted self-representations in socially anxious individuals.

*Key words***:** video feedback, audience feedback, state anxiety, perceived probability of negative evaluation, perception of performance.

Introduction

Social Anxiety Disorder (SAD) is characterised by a persistent fear of social situations whereby negative evaluation by others may occur, resulting in cognitive, behavioural, and physical symptoms of anxiety (American Psychiatric Association [APA], 2013). Cognitive models of SAD (Clark & Wells, 1995; Rapee & Heimberg, 1997) have posited that biased self-imagery, alongside self-focused attention and safety behaviours, is a key maintaining factor in social fears. Research has shown that socially phobic individuals report experiencing spontaneous, recurrent negative self-imagery prior to or during anxiety-provoking social situations in comparison to non-clinical groups (e.g., Hackmann, Clark, & McManus, 2000; Hackmann, Surawy, & Clark, 1998). The distorted self-images involve an *observer's perspective* (Hackmann et al., 1998) and are discrepant from what is truly visible to others (Rapee & Lim, 1992), leading to underestimations of performance, overestimations of anxiety symptom visibility, and large discrepancies between self and objective-observer perceptions of performance (Hirsch, Clark, Mathews, & Williams, 2003; Hirsch, Meynen, & Clark, 2004; Makkar & Grisham, 2011). To target distorted self-imagery, video feedback can usefully provide a more objective source of information about one's social performance, and has been incorporated into cognitive therapy for SAD (Clark et al., 2006; McEvoy & Saulsman, 2014).

Video feedback (VF) is a process that provides individuals with the opportunity to view a video playback of their social performance following a task such as public speaking. Observing video recordings of their social performance provides socially anxious individuals with information that is incompatible with their biased self-perception (Clark, 2001; Rapee & Hayman, 1996). Harvey, Clark, Ehlers, and Rapee (2000) suggested that including cognitive preparation before the video feedback can emphasise objective viewing of the video and maximise the difference between distorted self-imagery and video evidence. Cognitive preparation guides participants to first imagine and predict in detail what they will see in the video, and then instructs them to focus on how they *appear* rather than how they *feel* while watching the video. It encourages participants to view the videotape of their performance in an objective manner and has been found to enhance the

therapeutic effects of video feedback as it led to greater improvements in participants' self-evaluations of performance in comparison to video feedback alone or an exposure control (Kim, Lundh, & Harvey, 2002; Rodebaugh, 2004; Rodebaugh, Heimberg, Schultz, & Blackmore, 2010). Nevertheless, the impact of video feedback with cognitive preparation (CP+VF) on participants' levels of anxiety has been mixed. While some studies have shown that CP+VF is effective in reducing anticipatory anxiety (Rodebaugh et al., 2010), others have found no significant change in state anxiety (i.e., anxiety experienced during speech tasks) ratings when compared to an exposure control (e.g., Orr & Moscovitch, 2010; Rodebaugh, 2004; Smits, Powers, Buxkamper, & Telch, 2006).

Orr and Moscovitch (2010) argued that the failure to reduce subjective anxiety may stem in part from the absence of a post-video feedback cognitive review, which allows individuals to engage in deeper processing and encoding of the feedback. They investigated whether the addition of a cognitive review process would enhance self-perceptions and reduce anxiety levels of socially anxious individuals. High socially anxious participants were randomly assigned to one of three conditions: exposure only (Control), CP+VF, or video feedback with cognitive preparation followed by a cognitive review (CP+VF+CR). The cognitive review involved two steps. First, participants worked through their perceived performance ratings with the experimenter and compared the items they rated more positively from pre to post-video feedback. Second, participants answered four questions (e.g., "What have you learned from this feedback?") designed to allow them to analyse the feedback, and to incorporate it into their global sense of selves. The researchers found that the two experimental groups (i.e., CP+VF and CP+VF+CR) did not differ significantly from one another on any of the dependent measures. Participants assigned to the CP+VF+CR condition but not the CP+VF group did demonstrate significant improvements in self-perception of performance following the cognitive review, relative to the Control (Cohen's *d*s: 0.83 and 1.14, respectively). However, there was no significant difference between these two groups on their level of anxiety during the speech performance.

To achieve reductions in anxiety, some researchers (Hirsch & Clark, 2007; Rapee & Hayman, 1996) have suggested that video feedback may need to be combined with other forms of feedback, such as input from a therapist or a group of audience members. In line with these suggestions, Smits et al. (2006) investigated the effects of providing video feedback of audience reactions to socially anxious participants following a speech performance task. Participants were instructed to focus on the facial expressions and specific reactions of the audience rather than remembering how they felt during the speech. Contrary to the authors' expectations, video feedback of the audience's facial expressions did not lead to reductions in anxiety, and changes in anxiety levels were delayed in comparison to that of an exposure group. These results led the authors to suggest that socially anxious individuals might interpret the ambiguous, non-verbal feedback (i.e., the audience's facial expressions) in a negative manner because of their biased information processing. Thus, more explicit verbal feedback from an audience that highlights the saliency of the disconfirming evidence related to the socially anxious individuals' performance may be needed to increase its effectiveness. In a similar manner, Hirsch and Clark (2007) highlighted possible beneficial effects of audience feedback through a comparison of the objective ratings made by independent observers with the individuals' self-ratings to assist them to understand the discrepancy in the perceived noticeability of their anxiety symptoms.

Taken together, although video feedback with cognitive preparation and cognitive review does help participants to view their performance more positively, and decrease their anticipatory anxiety to perform in future social situations, to date, the effect of these techniques on state anxiety during social tasks has not been demonstrated (e.g., Orr & Moscovitch, 2010; Rodebaugh, 2004). It is yet to be determined whether changes to the state anxiety levels of socially anxious individuals may require other sources of feedback, such as feedback from an audience group (Hirsch & Clark, 2007; Rapee & Hayman, 1996). To address this gap, Chen and colleagues conducted two studies to examine whether adding audience feedback to video feedback protocols would produce enhanced effects. In their pilot study, Chen et al. (2010) examined how video feedback with peer ratings

would affect perceived performance and anticipatory anxiety in various social anxiety-provoking situations in SAD patients who participated in group cognitive behaviour therapy (CBT). During one CBT program session, participants were asked to undertake role plays of anxiety-provoking situations. After completing video feedback and cognitive preparation as per Harvey et al.'s (2000) procedures, participants were: (1) provided with immediate feedback from the peer group members who served as an audience, with the feedback presented graphically alongside the participants' own pre and post-video feedback ratings, and (2) instructed to summarise what they had learned from the comparisons of their own ratings with those of the group members. Following video feedback and peer feedback, participants experienced a significant decrease in the underestimation of their performance and anticipatory anxiety, compared with ratings made prior to the video and peer feedback (Cohen's *d*s: 0.46-1.37). However, the lack of a control group and the confounded procedure within the CBT program made it impossible to determine whether video feedback and/or peer feedback contributed to the size of the effect.

In response, Chen, Mark, and Fujita (2015) included a control condition in their investigation of the effect of combined video feedback with cognitive preparation and audience feedback on self-perceptions of performance and perceived bodily sensations as well as state anxiety pertaining to a speech task. Socially anxious students were randomly allocated to a combined video feedback with cognitive preparation and audience feedback condition (CP+VF+AF), a video feedback with cognitive preparation condition (CP+VF), an audience feedback condition (AF), or a control condition (Control). Following a 3-minute speech, participants in the active experimental conditions watched a videotape of their speech with cognitive preparation in the presence of three confederates who served as the audience, and/or received feedback from the confederates, while those in the Control watched their videotaped speech without cognitive preparation. Both the CP+VF+AF and the AF conditions showed similar improvements in distorted appraisal of performance and state anxiety compared to the CP+VF and the Control conditions. Furthermore, compared to the Control, the between-group effect sizes of the

CP+VF+AF were 2.63 for self-perception of performance and 0.92 for state anxiety; by contrast effect sizes reported in previous studies involving CP+VF or CP+VF+CR ranged from 0.49 to 0.93 for self-perception of performance (Harvey et al., 2000; Kim et al., 2002; Orr & Moscovitch, 2010) and 0.46 for state anxiety (Orr & Moscovitch, 2010). These preliminary results led Chen et al. (2015) to suggest that combining video feedback with cognitive preparation and audience feedback may be more beneficial than video feedback on its own for improving anxiety symptoms pertaining to a social task. However, their study was limited by a relatively small sample size (n = 41) and the lack of a second speech to determine whether the effects of the combined feedback generalise.

Thus the current study aimed to replicate Chen et al.'s (2015) findings in a larger sample of individuals with social anxiety, and to extend their protocol to include a second speech. This second speech was included to examine whether the findings would generalise. Specifically, we sought to determine whether the effects of video feedback with cognitive preparation plus audience feedback could be maintained beyond the immediate manipulation and would transfer to another social context, namely that of a different speech task. Including such a second speech is a common procedure that has been repeatedly used in studies that examine the effects of video feedback (e.g., Harvey et al., 2000; Kim et al., 2002; Orr & Moscovitch, 2010; Rapee & Hayman, 1996).

In addition, we sought to improve the cognitive review component inherent in the audience feedback procedure as used by Chen et al. (2010; 2015). The procedure already included components of cognitive review, namely in the second step of the procedure participants were required to reflect on what they had learned from the audience feedback. However, to improve upon this cognitive review component, we incorporated elements of Orr and Moscovitch's (2010) protocol. That is, the experimenter took participants through their speech performance ratings from pre- to post-feedback as well as the audience's ratings, and asked them to answer two additional questions (i.e., "How does this feedback make you feel?", and "How will this feedback influence your capability to perform in future social situations such as public speaking, interacting and

communicating with others?"). This allows for deeper processing of the video and audience feedback (Orr & Moscovitch, 2010).

Accordingly, the present study aimed to examine the effects of video feedback with cognitive preparation combined with audience feedback (and cognitive review) on state anxiety, self-perceptions of performance, and perceived probability of negative evaluations in socially anxious individuals. Socially anxious students were randomly assigned to four conditions, namely Video Feedback with cognitive preparation plus Audience Feedback and Cognitive Review (CP+VF+AF+CR), Video Feedback with cognitive preparation and Cognitive Review (CP+VF+CR), Video Feedback with cognitive preparation only (CP+VF), and exposure without feedback (Control). They were asked to deliver two speeches that would be watched and evaluated by three confederates who served as an audience and would provide feedback on their speech performance according to their allocated condition. It was expected that participants who received audience feedback in addition to video feedback with cognitive preparation and cognitive review would report a significant decrease in their state anxiety and perceived probability of negative evaluation scores, and a significant increase in their perception of speech performance scores from before to after the feedback compared to participants in the other conditions. Furthermore, we examined whether any positive effects that were evident after participants received the video and audience feedback and the cognitive review would be maintained through to a second speech. Previous data have demonstrated that after a second speech, CP+VF was superior to VF, and that there was no difference between CP+VF and CP+VF+CR on anxiety responses (Kim et al., 2002; Orr & Moscovitch, 2010). Hence, we hypothesised that all three conditions with active experimental manipulations would show significantly higher positive perception of speech performance scores, and lower state anxiety and perceived probability of negative evaluation scores than the Control after the second speech.

Method

Participants and Design

We conducted a power analysis based on the findings of Orr and Moscovitch (2010). The mean reduction from pre- to post-intervention in perceived speech performance in the CP+VF+CR condition compared to the exposure only condition was 9.00 (*SD* = 2.06). Using these values, we estimated that a sample of 35 participants per condition would provide 80% power at .05 alpha level. Hence, we sought to recruit a total of 140 participants.

Figure 1 presents the details of participant recruitment. One hundred and fifty-one undergraduate students from Flinders University (mean age = 22.59 years, *SD* = 6.57) were recruited for participation in the study. First year psychology students gained course credit for their participation, while other students received a small payment for their time. Participants were selected if they satisfied at least two cut-off scores on three commonly used social anxiety measures: 25 or higher on the Brief Fear of Negative Evaluation Scale–Straightforward items (BFNE-S; Rodebaugh et al., 2004), 24 or higher on the Social Phobia Scale (SPS; Mattick & Clarke, 1998), and 34 or higher on the Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998). Participants were randomly assigned to one of the following four conditions using a random number generator in blocks of four: cognitive preparation and video feedback plus audience feedback plus cognitive review (CP+VF+AF+CR); cognitive preparation and video feedback plus cognitive review (CP+VF+CR); cognitive preparation and video feedback (CP+VF); speech exposure without feedback (Control). Eleven participants (two in the CP+VF+AF+CR condition, three in each of the other conditions) who failed to continue the experimental session were excluded from the analyses due to a lack of assessment data, leaving a total of 140 participants whose data were included in the subsequent analyses. Table 1 displays participants' demographic characteristics across conditions. Most participants were female (75.7%, *n* = 106) and Australian (59.3%, *n* = 83); other represented ethnicities were Asian (32.1%, *n* = 45), European (2.1%, *n* = 3), and otherwise unclassified (6.4%, *n* = 9). There were no differences in gender and ethnicity across the four conditions (gender: χ^2 (3) = 2.64, *p* = .45; ethnicity: χ^2 (3) = 3.13, *p* = .37). The study was approved by the University's Social and Behavioural Research Ethics Committee.

Measures

Brief Fear of Negative Evaluation Scale – Straightforward items (BFNE-S). The Brief Fear of Negative Evaluation Scale (BFNE; Leary, 1983) measures fear of negative evaluation by others. It consists of 12 items with a 1 (*not at all characteristic of me*) to 5 (*extremely characteristic of me*) rating scale. The current study used the eight straightforwardly worded items, which have been demonstrated to be more reliable and better at detecting social anxiety (Rodebaugh et al., 2004). Higher total scores represent greater levels of fear of negative evaluation. The BFNE has shown high correlations with the original FNE (r = .96), high internal consistency (α = .81) and good convergent and discriminant validity (Leary, 1983; Weeks et al., 2005). A cut-off score of 25 or above on the straightforward version has been suggested to be appropriate for the diagnosis of SAD (Carleton, Collimore, McCabe, & Antonyb, 2011). The internal consistency of the BFNE in the current study was .85.

The Social Phobia Scale (SPS) and the Social Interaction Anxiety Scale (SIAS). The SPS and the SIAS (Mattick & Clarke, 1998) are commonly used to measure trait social anxiety. Both the SPS and the SIAS include 20 items with a 0 (*not at all characteristic or true of me*) to 4 (*extremely characteristic or true of me*) rating scale. The SPS measures fear of being scrutinised by others while the SIAS assesses fear of social interactions. Scores of 24 and above on the SPS, and 34 and above on the SIAS are recommended as clinical cut-offs for SAD (Brown et al., 1997; Mattick & Clarke, 1998). Both of these self-report scales have demonstrated good psychometric properties with good internal consistency (SPS: α = .89-.94; SIAS: α = .88-.93) and high test-retest reliability (SPS: .91-.93; SIAS: .92) (Heimberg, Mueller, Holt, Hope, & Liebowitz, 1992; Mattick & Clarke, 1998). The two scales also have good convergent validity (r = .60-.66; Mattick & Clarke, 1998). The internal consistency of the SPS and the SIAS in the present study were .90 and .89, respectively.

Perception of Speech Performance (PSP). The PSP (Rapee & Lim, 1992) was used to measure participants' self-perceptions of their speech performance. The PSP consists of 17 items,

12 of which measure specific aspects of speech performance (e.g., blushed, stuttered) and 5 of which measure global aspects of speech performance (e.g., appeared nervous). Each item was rated on a 0 (*not at all*) to 4 (*very much*) rating scale, with higher scores indicating a more positive view of one's performance. The PSP has demonstrated good internal consistency (α's > .86) and good inter-rater reliability (> .75), as well as good convergent validity (r = .63-.66) in past studies (Orr & Moscovitch, 2010; Rodebaugh, 2004; Rodebaugh & Chambless, 2002). The internal consistency in the current study ranged from .86 to .91 at the three time points of assessment.

State Anxiety Rating (SAR). The 10-item SAR (Rapee & Abbott, 2007) was used to measure participants' current levels of anxiety related to their speech performance (e.g., I felt nervous about the speech). Participants were instructed to rate their anxiety during the speech on 0 (*not at all*) to 4 (*extremely*) rating scales, with higher scores indicating greater levels of state anxiety. The internal consistency of the SAR was very good (α = .96) and so was the convergent validity (r = .71-.72) (Chen, Rapee, & Abbott, 2013; Rapee & Abbott, 2007). The internal consistency in the current study ranged from .92 to .95 at the three time points of assessment.

Probability and Cost of Negative Evaluation Questionnaire (PCNE). The PCNE (Rapee & Abbott, 2007) measures participants' perceived likelihood and cost of negative evaluation by the audience. The 14-item PCNE consists of two subsets of questions, with one set assessing perceived likelihood of negative evaluation from the audience (e.g., "How likely is it that they would think you look anxious?") and the other assessing the perceived cost of negative evaluation (e.g., "How bad would it be for you if they would think you look anxious?"). Although testing participants' perceived likelihood of negative evaluation is appropriate under the experimental setting, an impromptu speech task does not necessarily lead to a cost to the participants (e.g., it may not be personally significant), therefore only the first subset of questions assessing probability (7 items) was used. Participants completed the items using a 0 (*not at all likely*) to 4 (*extremely likely*) rating scale. The PCNE demonstrated high internal consistency (α = .93) and was positively associated

with trait social anxiety (r = .50; Rapee & Abbott, 2007). The internal consistency in the current study ranged from .89 to .94 at the three time points of assessment.

Procedure

As depicted in Figure 1, participants completed online screening questionnaires including the BFNE-S, SPS, and SIAS. After screening, eligible participants were invited to participate in the study. Upon arrival, participants were informed of the aim of the study and that participation would entail performing a 3-minute speech in front of an audience (three confederates who were already seated in the room) and a video camera, and they would later be shown the video. After consenting, participants were randomly allocated to one of the four conditions and were provided with a list of potential speech topics (e.g., "Favourite holiday", "University life"). They were asked to select two speech topics with a familiarity of around 5 to 7 (from 0 "*not at all familiar"* to 10 "*very familiar"*) and a perceived level of anxiety of 6 to 7 (from 0 "*not at all anxious"* to 10 "*very anxious"*), and then select one of them for the 3-minute speech. Similar to Orr and Moscovitch (2010), we used the familiarity rating to control for participants' familiarity with the speech topic as this could influence speech content, and in turn anxiety levels, which may interfere with the smooth delivery of the speech. The perceived anxiety rating was based on Chen et al. (2010) to ensure that the topic provoked anxiety. Participants were then given 2 minutes to mentally plan their first speech. They then delivered the first speech in front of three confederates who served as an audience and the video camera. To control for any potential influence of facial expressions from the confederates, they were trained to maintain a natural facial expression throughout each participant's speech. If participants were unable to speak for the full 3 minutes, post-speech measures were administered immediately. After the speech, all participants completed the PSP, SAR and PCNE-Probability questionnaires (Time 1). Following this, participants in the active conditions received manipulations according to their randomly assigned condition, whereas those in the Control completed filler tasks. The various components of each of the manipulations are described below.

Cognitive preparation and Video Feedback. The cognitive preparation and video feedback followed Harvey et al.'s (2000) procedures that include three steps. Specifically, participants were asked to: (1) select two items (e.g., blushed, stuttered) they rated as 4 (very much) from the PSP that they had completed after the speech as their main concerns; (2) imagine how they thought they would appear during their speech by focusing on their main concerns, and then indicate the vividness of their image on a scale from 0 "*not at all vivid*" to 100 "*extremely vivid*"; and (3) watch the video of themselves "as if observing a stranger", concentrating on how they *looked* and what they *did* but not how they *felt,* paying specific attention to their main concerns. The cognitive preparation took 7 minutes to complete. Following this, participants watched their videotaped speech.

Audience Feedback. Audience feedback was delivered as per the procedure in Chen et al. (2010, 2015). After viewing the video, both participants and confederates, the latter of whom served as an audience, completed the PSP based on the performance they observed in the video. Participants then received verbal feedback from the confederates. The three confederates were trained to provide the *verbal* feedback in one sentence (e.g., "I don't think you blushed or stuttered") in a consistent natural manner. Two of them addressed each participant's two concerns (e.g., blushed, stuttered), and one addressed the overall quality of the speech (e.g., appeared nervous). While the confederates provided the participant with feedback, the experimenter entered the ratings provided by participants before and after the video feedback, as well as the confederates' ratings, into a computer. Confederates were trained to be polite, kind, and provide the feedback in a constructive manner. Due to ethics requirements, when the confederates' ratings were lower than the participant's own scores, the mean scores of the confederates' ratings should be adjusted so that the feedback was positive. However, there were no participants whose own ratings of performance were higher than those of the confederates. Following the confederates' feedback, participants were shown the data on the computer in the form of a graphical representation, which included the confederates' ratings and the participants' own ratings of their performance both before and after

they watched the video. Participants were asked to describe what they saw in the graph and what they thought about the difference in ratings and to state the extent to which they believed the confederates' feedback to be real on a 0 (*not at all true*) to 100 (*extremely true*) scale.

Cognitive Review. The procedure for the cognitive review was based on Orr and Moscovitch (2010). It involved two steps that have been suggested to enable participants to process and analyse the feedback they received, and internalise and integrate it into their self-image (Orr & Moscovitch, 2010). In Step 1, the experimenter took the participant through all of the items on the PSP which they had rated more positively following the video feedback relative to before the video feedback. For participants who received audience feedback, they went through the ratings following both the video feedback and audience feedback relative to before that feedback. Participants were required to fill out a form that asked them to compare the differences in their self-ratings of the PSP before and after they received video feedback/audience feedback, paying specific attention to their main concerns. For example, participants were instructed to fill in the blanks of statements such as "At first I thought I stuttered _____ (insert your PSP rating before the feedback). After watching the video, I realised I stuttered _____ (insert your PSP rating after the feedback)". This comparison was repeated for all items on the PSP that improved from before to after video feedback/audience feedback. In Step 2, participants were asked to provide comprehensive written answers to three questions: "How does this feedback make you feel?", "What have you learned from this feedback?" and "How will this feedback influence your capability to perform in future social situations such as public speaking, interacting and communicating with others?".

As can be seen in Figure 1, while participants in all three active conditions received the 7-minute cognitive preparation, participants in the Control completed a filler task of drawing shapes. Following the cognitive preparation, participants in the three active conditions received video feedback and watched their videotaped speech with the confederates while the Control watched a video clip on the University's library. After viewing the videos, participants in the CP+VF+AF+CR condition received audience feedback followed by the cognitive review. Participants in the

CP+VF+CR condition received cognitive review and completed a filler task of finding hidden figures. Participants in the other two conditions completed the same filler task of finding hidden figures and also read a passage on the history of the city of Adelaide. The filler tasks were administered to match the approximate length of time of the manipulation(s) that participants did not receive. Subsequent to the completion of these tasks, all participants again completed the PSP, the SAR and the PCNE-Probability questionnaires (Time 2), which was followed by a second speech on a different topic that they had chosen prior to the first speech. At the conclusion of the second speech, the PSP, the SAR and the PCNE-Probability set of questionnaires were administered for the final time (Time 3). Finally, participants were debriefed and thanked for their participation. The experiment lasted approximately 45 minutes.

Statistical Analysis

One-way ANOVAs were carried out to compare participants on: (1) mean scores for the baseline measures (BFNE-S, SPS, and SIAS) in the four conditions; (2) familiarity and perceived anxiety of the selected speech topics in the four conditions; and (3) vividness ratings of the images in the three conditions that received video feedback.

Three 4 (Condition: CP+VF+AF+CR, CP+VF+CR, CP+VF, Control) X 3 (Time: after speech 1, after feedback, after speech 2) mixed ANOVAs were carried out to test the efficacy of combined video feedback, audience feedback, and cognitive review on participants' self-perceptions of their speech performance, current levels of anxiety related to their speech performance, and their perceived likelihood of negative evaluation. The critical comparison between conditions in change over time is indexed by the two-way Condition X Time interaction. Hence, for significant two-way interactions, follow-up analyses consisted of single degree-of-freedom interaction contrasts comparing each condition pair over time. That is, six separate 2 (Condition) X 3 (Time) mixed ANOVAs were carried out (CP+VF+AF+CR vs. CP+VF + CR; CP+VF+AF+CR vs. CP+VF; CP+VF+AF+CR vs. Control; CP+VF+CR vs. CP+VF; CP+VF + CR

vs. Control; and CP+VF vs. Control). To correct for multiple comparisons, a modified Bonferroni-adjusted alpha level of .008 was used in all follow-up analyses.

Given the study's aims and hypotheses, the most important outcomes of the ANOVAs were the Condition X Time interactions. Hence, our results primarily focused on the Condition X Time interaction effects but not the main effects of Time or Condition. Furthermore, to allow for meaningful comparisons of the magnitude of change in each condition, effect sizes (Cohen's *d*) were calculated using mean change scores (i.e., after speech 1 vs. after feedback, after feedback vs. after speech 2, after speech 1 vs. after speech 2) that were divided by a common SD based on the whole sample. The purpose of using the SD of the differences for the whole sample for each calculation was to overcome the problem that SD of the difference scores varies across the individual conditions. By doing so, the effect sizes could be compared across conditions because all reflected the mean difference using the same standard. In essence, the interaction reflects differences in effect sizes (i.e., Cohen's *d*) across conditions.

Results

Manipulation Check

A manipulation check was conducted to determine the extent to which participants believed the feedback provided by the confederates was real in the CP+VF+AF+CR condition. Results showed that participants in the CP+VF+AF+CR condition had a moderate degree of belief that the evaluations were actually made by the confederates (M = 65.93, SD = 18.18).

Preliminary Analyses

Missing values analysis was conducted using Expectation-Maximization imputation for a total of 14 individual scores missing at random. Demographic variables and mean scores on the baseline measures are presented in Table 1. There were no differences across conditions in the BFNE-S, the SPS or the SIAS scores.

Differences between Conditions in Familiarity, Anxiety Levels of the Speech Tasks, and Imagery Vividness

There was a significant difference between conditions in familiarity ratings for speech 1, F (3, 139) = 3.00, p = .03. However, post hoc analysis revealed no significant pair-wise differences between the conditions. There were no significant differences between the conditions in familiarity ratings for speech 2, F (3, 138) = 2.05, p = .11, nor in anxiety ratings for speech 1, F (3, 139) = .33, p = .80, or speech 2, F (3, 139) = .95, p = .42 (see Table 1). For the three conditions that received cognitive preparation, there were no significant between-group differences in imagery vividness, F (2, 102) = .93, p = .40. Mean ratings of imagery vividness was 57.93, which indicated that the manipulations were successful in producing at least somewhat vivid imagery.

Primary Analyses

Table 1 presents values for the primary dependent variables across conditions.

State Anxiety Rating (SAR). The 4 (Condition) X 3 (Time) mixed ANOVA revealed a significant Condition X Time interaction, F (5.66, 256.51) = 7.78, p < .001, η^2 = .15 (see Figure 2). Hence, six separate 2 (Condition) X 3 (Time) mixed ANOVAs were conducted to compare the two conditions over time to test single degree-of freedom interaction contrasts. Results for follow-up analyses can be found in Table 2.

ANOVAs comparing the effect of CP+VF+AF+CR with the other three conditions showed significant Condition X Time interactions. Follow-up analyses further revealed that although there was no difference between conditions after Speech 1, the CP+VF+AF+CR condition evidenced significantly lower SAR scores than did the other conditions after receiving audience feedback (all ps <.002), and after Speech 2 (all ps < .001). In contrast, in the ANOVAs comparing CP+VF+CR vs. CP+VF, CP+VF+CR vs. Control, and CP+VF vs. Control, there was no significant interaction between condition and time.

Calculation of the within-subject effect sizes demonstrated that from after Speech 1 to after receiving feedback (or completing the filler tasks), there were large effect sizes in the CP+VF+AF+CR (Cohen's d = 1.71) and CP+VF+CR conditions (Cohen's d = 0.89), but small effect sizes in the other two conditions (see Table 1). From after receiving feedback (or completing

the filler tasks) to after Speech 2, the effect sizes were small in all the conditions. From after Speech 1 to after Speech 2, the CP+VF+AF+CR condition demonstrated large effect sizes (Cohen's *d* = 1.34), whereas the other conditions demonstrated small to medium effect sizes (Cohen's *d*s = 0.48-0.52).

Perception of Speech Performance (PSP). The 4 (Condition) X 3 (Time) mixed ANOVA revealed a significant Condition X Time interaction, F (6, 272) = 16.56, $p < .001$, $\eta^2 = .27$ (see Figure 3). Accordingly, to compare the two conditions over time, six separate 2 (Condition) X 3 (Time) mixed ANOVAs were conducted. Results for follow-up analyses are reported in Table 2. ANOVAs comparing CP+VF+AF+CR with the other three conditions resulted in significant Condition X Time interactions. Follow-up analyses further revealed that although there was no significant difference between conditions after Speech 1, the CP+VF+AF+CR condition showed significantly higher PSP scores than the other conditions after receiving feedback (all *p*s <.001) and after Speech 2 (all *p*s < .004).

The comparison of the CP+VF+CR vs. Control conditions also showed a significant Condition X Time interaction ($p = .01$), whereas the comparison of the CP+VF vs. Control conditions, showed a trend towards such an interaction ($p = .05$). Follow-up analyses showed that participants in the CP+VF+CR and VF conditions reported significantly higher PSP scores than those in the Control only after receiving the manipulations but not after Speech 2.

Calculation of the within-subject effect sizes demonstrated that from after Speech 1 to after receiving feedback (or completing the filler tasks), there were large effect sizes in the CP+VF+AF+CR condition (Cohen's *d* = 2.04), but small to medium effect sizes in the other conditions (Cohen's *d*s = 0.26-0.79). From after receiving feedback (or completing the filler tasks) to after Speech 2, the effect sizes were small to medium in all the conditions. From after Speech 1 to after Speech 2, all conditions showed large effect sizes in the change of their PSP scores (see Table 1).

Probability and Cost of Negative Evaluation questionnaire-Probability (PCNE-P). The 4 (Condition) X 3 (Time) mixed ANOVA revealed a significant Condition X Time interaction, F (6, 272) = 13.94, $p < .001$, $\eta^2 = .24$ (see Figure 4). Subsequently, six separate 2 (Condition) X 3 (Time) mixed ANOVAs were conducted to compare the two conditions over time. Results for follow-up analyses are displayed in Table 2. ANOVAs comparing the effect of CP+VF+AF+CR with the other three conditions showed significant Condition X Time interactions. Follow-up analyses further revealed that although there was no difference between conditions after Speech 1, the CP+VF+AF+CR condition showed significantly lower PCNE-P scores than the other conditions after receiving audience feedback and after Speech 2 (all ps <.001).

A significant Condition X Time interaction ($p = .02$) was also found for the comparison of the CP+VF+CR vs. Control conditions. However, further analyses revealed no significant difference between these two conditions across time. No other Condition X Time interaction effects were found.

Calculation of the within-subject effect sizes demonstrated that there were large effect sizes (Cohen's ds = 1.53-1.72) in the CP+VF+AF+CR condition but only small to medium effect sizes (Cohen's ds = 0.11-0.72) in the other conditions from after Speech 1 to after receiving feedback (or completing the filler tasks), as well as from after Speech 1 to after Speech 2. From after receiving feedback (or completing the filler tasks) to after Speech 2, the effect sizes were small in the four conditions (see Table 1).

Discussion

The present study investigated the effects of combined audience feedback, video feedback with cognitive preparation, and cognitive review on state anxiety, self-perceptions of speech performance, and perceived probability of negative evaluation in socially anxious individuals who performed an impromptu speech task. Supporting our hypotheses, participants who received the additional audience feedback reported a greater decrease in state anxiety and probability of negative evaluation, and rated their performance as better than the other conditions. However, consistent

with previous research (Orr & Moscovitch, 2010; Rodebaugh, 2004; Smits et al., 2006), neither CP+VF nor CP+VF+CR led to a reduction in participants' state anxiety during the speech task when compared to the Control. In addition, in line with Orr and Moscovitch (2010), no significant difference was observed between the CP+VF and the CP+VF+CR condition in participants' state anxiety and performance ratings. There was also no significant difference between the three conditions without audience feedback in participants' perceived probability of negative evaluation scores. These results parallel and extend findings from previous studies (Chen et al., 2010, 2015; Kanai, Sasagawa, Chen, & Sakano, 2011; Orr & Moscovitch, 2010), demonstrating a beneficial effect of combined audience feedback with video feedback plus cognitive preparation and cognitive review on negative self-perceptions of performance, perceived negative evaluation, and state anxiety. In addition, effect sizes in the CP+VF+AF+CR condition for the reduction of both state anxiety and perceived negative evaluation were two to three times as large as those of the other conditions. Together with these large effect sizes in the condition with the addition of audience feedback and the non-significant differences between the conditions without audience feedback, our findings illustrate the superiority of the combined audience feedback with video feedback plus cognitive preparation and cognitive review in improving participants' negative self-perceptions and state anxiety compared to those without audience feedback.

Consistent with previous studies (e.g., Harvey et al., 2000; Kim et al., 2002; Orr & Moscovitch, 2010; Rodebaugh et al., 2010), our results revealed that CP+VF+CR and CP+VF led to enhanced self-perceptions of performance. However, contrary to previous findings (Orr & Moscovitch, 2010; Rodebaugh et al., 2010), although the two conditions displayed greater scores in perceptions of performance than the Control after receiving the manipulation, this difference disappeared after the second speech. One possible explanation for this discrepancy is the experimental setting used in the current study where participants were asked to perform the speech task in front of three confederates instead of the experimenter only (the common setting in most previous studies, e.g., Orr & Moscovitch, 2010; Rodebaugh, 2004; Rodebaugh & Rapee, 2005).

Although including a live audience is more ecological, such a setting may be more anxiety-provoking and may eliminate the effect of the intervention on the self-evaluation of performance.

Importantly, the improvements in state anxiety, self-perceptions of performance, and perceived negative evaluation observed with the addition of audience feedback extended through to a second speech performance, unlike the other conditions. Although effect sizes were small to medium for changes from after receiving feedback (or completing the filler tasks) to after Speech 2 in all the conditions, the CP+VF+AF+CR condition showed large effect sizes in state anxiety and perceived negative evaluation whereas the other conditions only showed small to medium effect sizes from after Speech 1 to after Speech 2. These findings suggest that rather than being a one-off effect, adding audience feedback to video feedback with cognitive preparation and cognitive review may be an effective method for maintaining improvements in symptoms of social anxiety and transferring its positive effects to another social task. These results are in accordance with previous research (Kim et al., 2002; Orr & Moscovitch, 2010; Rapee & Hayman, 1996; Rodebaugh, 2004; Rodebaugh et al., 2010), giving extra weight to the literature on the generalisation effects of video feedback. In keeping with Orr and Moscovitch (2010) and previous research (Chen et al., 2010, 2015; Kanai et al., 2011), it is possible that the addition of audience feedback enabled participants to process the feedback they received at a deeper level, and to transfer this feedback through to the second speech. As such generalisation is important in the context of clinical interventions for social anxiety, further research should investigate whether the positive effects of adding audience feedback to video feedback with cognitive preparation and cognitive review can be maintained beyond the immediate intervention and would transfer to other broader social contexts than speech delivery (e.g., one-on-one or group interactions).

In speculating as to the effect of the addition of audience feedback, there are a number of possible mechanisms by which audience feedback may be operating to improve state anxiety and self-perceptions pertaining to speech performance. First, according to Clark and Wells (1995) and Rapee and Heimberg (1997), presenting socially anxious individuals with objective information that

is incompatible with their negatively biased self-image will allow them to detect discrepancies between how they believe they appear, and how they actually appear, resulting in improved mental representations and anxiety symptoms. In our study, audience feedback was added to the existing video feedback with cognitive preparation and cognitive review by providing the audience's explicit feedback and comparing their ratings with the socially anxious individuals' self-ratings related to speech performance, based on the procedures suggested in previous studies (Chen et al., 2010, 2015; Hirsch & Clark, 2007). It is possible that the explicit and immediate verbal feedback from an audience more effectively highlights the saliency of disconfirming evidence related to the socially anxious individual's performance (Smith et al., 2006), resulting in improved negative self-perceptions of performance, expectations of negative evaluation, and state anxiety related to the performance.

Second, Rapee and Heimberg (1997) proposed that changing anxiety should be most directly addressed by changing the expectation of negative evaluation and only indirectly by changing the mental representation. The non-significant effects on state anxiety in the CP+VF condition and the CP+VF+CR condition suggest that video feedback procedures in previous studies may only have addressed the mental representation. Hence, changing mental representations may not be sufficient to change anxiety as it only addresses the anxiety indirectly. By contrast, the superiority of the additional audience feedback condition compared to the other two active conditions implies that the change in the expectations of negative evaluation resulting from combining cognitive preparation and video feedback with audience feedback may have a more direct influence on anxiety. This, in turn, may result in reductions in both the mental representation and negative evaluation, thus producing the most powerful influence on anxiety. To date, most previous studies have primarily focused on the effect of video feedback with cognitive preparation on the perception of performance and anxiety (anticipatory anxiety or state anxiety). Few studies have examined the effects of intervention techniques on the perceived probability of negative evaluation pertaining to a social performance, even though fear of negative evaluation is the core

feature of SAD (APA, 2013). Our study was the first to do so. Given that estimated negative evaluation is a specific expression of the dysfunctional beliefs about the potential outcome of a social encounter (Hofmann & Scepkowski, 2006), the effect of the addition of audience feedback on the dysfunctional beliefs related to a social performance may have implications for future treatments.

Finally, research has revealed that people high in social anxiety show a bias in the way they interpret and remember feedback provided by others (Edwards, Rapee, & Franklin, 2003). Such interpretation and memory biases serve as maintenance factors in social anxiety (Clark & Wells, 1995) and lead to subsequent anxiety symptoms. Based on these suggestions, another possible explanation for our results is that the explicit and immediate verbal feedback from an audience may play an important role in eliminating or reducing such biases, resulting in improvements in self-perception and anxiety reduction. The relationship between biased self-imagery and interpretation bias is posited in cognitive models of SAD (Clark & Wells, 1995; Rapee & Heimberg, 1997). These models suggest that socially anxious individuals hold a distorted image based on their interpretations of internal sensations, observations of one's own behaviour, and the reactions of others. In line with this, Hirsch, Clark, and Mathews (2006) introduced the combined cognitive biases hypothesis, which posits an interaction between biased self-imagery and interpretation bias in maintaining the disorder. Thus, future studies could carefully explore the role of interpretation bias and/or other cognitive biases (e.g., self-focused attention and safety behaviours) in the context of video feedback, rather than a specific bias in isolation (Hirsch et al., 2006).

One potential limitation of the current study is that the results are derived from a non-clinical sample of socially anxious university students. Although participants scored highly on the social anxiety measures, and social anxiety research on non-clinical populations can be used to inform investigations of clinical populations (Rapee & Heimberg, 1997), future research should examine whether our findings generalise to treatment-seeking individuals with a clinical diagnosis of SAD.

Nevertheless, the current results replicate and extend previous findings (Chen et al., 2010, 2015; Harvey et al., 2000; Orr & Moscovitch, 2010) by demonstrating that participants are likely to benefit from combined audience feedback and video feedback with cognitive preparation and cognitive review through an improvement in not only self-perceptions of performance, but also state anxiety and perceived probability of negative evaluation pertaining to a social situation. Our findings highlight the potential of enhanced therapeutic effects on state anxiety symptoms from additional explicit verbal feedback from an audience to existing video feedback protocols, and thus present an important clinical innovation. Further research should identify the underlying mechanism by which audience feedback facilitates the effect of video feedback through the prevention of potential biased cognitive processing, and whether this effect can be maintained over the longer-term. Furthermore, our findings suggest possible benefits of using this combined technique not only for individual but also group CBT for SAD. To date, research has demonstrated that group CBT for SAD is cost-effective (Gould, Buckminster, Pollack, Otto, & Yap, 1997) and is associated with lower relapse rates than phenelzine (Liebowitz et al., 1999). Video feedback is a key component of Cognitive Therapy protocols either in individual or group treatment (Chen et al., 2010; Clark et al., 2006; Hirsch et al., 2003; McEvoy & Saulsman, 2014). Our findings indicate the therapeutic effects of audience feedback with video feedback plus cognitive preparation and cognitive review and the possibility of disseminating this technique in group CBT. Future studies should replicate our findings in diagnosed SAD populations and establish a robust but easy to implement procedure to allow such a technique to be translated into clinical practice.

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Table 1.

Demographic Characteristics, Means and Standard Deviations, and Within-subject Effect Sizes (Cohen's d) for SAR, PSP, and PCNE-P

	Condition			
	CP+VF+AF+CR (n = 35)	CP+VF + CR (n = 35)	CP+VF (n = 35)	Control (n = 35)
Age in years, *M* (*SD*)	21.11 (3.72)	22.00 (6.25)	22.69 (4.50)	24.34 (10.95)
Gender				
Male, *n* (%)	7 (20.0)	8 (22.86)	12 (34.29)	7 (20.0)
Female, *n* (%)	28 (80.0)	27 (77.14)	23 (65.71)	28 (80.0)
BFNE-S	30.03 (5.04)	29.69 (4.64)	30.49 (6.18)	29.43 (5.30)
SPS	37.49 (13.50)	37.80 (15.12)	37.97(14.64)	37.83 (12.17)
SIAS	40.11 (13.28)	41.74 (12.61)	45.69 (13.23)	44.37 (11.67)
Familiarity (speech 1)	8.71 (1.25)	7.86 (1.68)	7.91 (1.27)	8.49 (1.54)
Anxiety (speech 1)	6.00 (2.20)	6.46 (2.02)	6.03 (2.38)	6.11 (2.00)
Familiarity (speech 2)	7.54 (1.72)	7.00 (1.85)	6.77 (1.80)	7.74 (2.05)
Anxiety (speech 2)	6.11 (1.97)	6.77 (1.63)	6.63 (1.80)	6.74 (2.01)
SAR				
Time 1	25.40 (9.06)	26.63 (8.78)	27.20 (9.28)	29.03 (8.54)
Time 2	12.43 (9.25)	19.86 (10.02)	23.94 (9.87)	25.77 (10.26)
Time 3	13.83 (8.62)	22.14 (9.13)	23.03 (11.27)	24.70 (10.24)
Effect sizes				
Time 1 vs. Time 2	1.71	0.89	0.43	0.43
Time 2 vs. Time 3	-0.18	-0.30	0.12	0.14
Time 1 vs. Time 3	1.34	0.52	0.48	0.50
PSP				
Time 1	26.57 (10.61)	25.63 (9.25)	27.49(11.31)	25.97(7.65)

Time 2	50.34 (9.12)	34.82 (7.53)	35.83 (9.98)	29.04 (9.12)
Time 3	47.14 (10.74)	39.06 (9.66)	39.54 (10.41)	35.43 (9.89)
Effect sizes				
Time 1 vs. Time 2	-2.04	-0.79	-0.72	-0.26
Time 2 vs. Time 3	0.34	-0.46	-0.40	-0.69
Time 1 vs. Time 3	-1.93	-1.26	-1.13	-0.89
PCNE-P				
Time 1	17.97 (6.19)	18.14 (6.32)	18.77 (5.38)	17.37 (5.19)
Time 2	6.91 (5.93)	14.43 (6.01)	15.89 (6.10)	16.69 (5.24)
Time 3	8.20 (6.24)	13.49 (6.87)	15.40 (7.41)	15.54 (5.87)
Effect sizes				
Time 1 vs. Time 2	1.72	0.58	0.44	0.11
Time 2 vs. Time 3	-0.26	0.19	0.10	0.23
Time 1 vs. Time 3	1.53	0.72	0.54	0.29

Note. Standard Deviations are in parenthesis. Time 1 = after Speech 1; Time 2 = after feedback or filler tasks; T3 = after Speech 2; CP = Cognitive preparation; VF: video feedback, AF = audience feedback; VF = video feedback; CR = cognitive review; BFNE-S = Brief Fear of Negative Evaluation Scale-Straightforward items; SPS = Social Phobia Scale; SIAS = Social Interaction Anxiety Scale; SAR = State Anxiety Rating; PSP = Perception of Speech Performance; PCNE-P = Probability and Cost of Negative Evaluation questionnaire–Probability items.

Table 2.

The Effect of Video Feedback with Audience Feedback and Cognitive Review on State anxiety and Negative Self-perceptions

Measure	Condition *F* (*p*)	Time *F* (*p*)	Time × Condition *F* (*p*)
SAR			
CP + VF + AF + CR vs. CP + VF + CR	8.98 (.004)	62.83 (.000)	8.12 (.000)
CP + VF + AF + CR vs. CP + VF	13.12 (.001)	67.47 (.000)	17.69 (.000)
CP + VF + AF + CR vs. Control	21.56 (.000)	65.04 (.000)	16.89 (.000)
CP + VF + CR vs. CP + VF	0.79 (.378)	14.34 (.000)	2.28 (.032)
CP + VF + CR vs. Control	3.25 (.076)	20.31 (.000)	2.30 (.104)
CP + VF vs. Control	0.66 (.419)	21.28 (.000)	0.01 (.994)
PSP			
CP + VF + AF + CR vs. CP + VF + CR	18.92 (.000)	179.56 (.000)	21.28 (.000)
CP + VF + AF + CR vs. CP + VF	11.56 (.001)	170.35 (.000)	21.62 (.000)
CP + VF + AF + CR vs. Control	31.26 (.000)	193.44 (.000)	58.20 (.000)
CP + VF + CR vs. CP + VF	0.36 (.551)	97.77 (.000)	0.17 (.848)
CP + VF + CR vs. Control	2.87 (.095)	103.62 (.000)	4.79 (.010)
CP + VF vs. Control	4.33 (.041)	95.10 (.000)	3.04 (.043)
PCNE-P			
CP + VF + AF + CR vs. CP + VF + CR	11.33 (.001)	87.60 (.000)	15.91 (.000)
CP + VF + AF + CR vs. CP + VF	19.63 (.000)	87.31 (.000)	20.84 (.000)
CP + VF + AF + CR vs. Control	21.77 (.000)	67.42 (.000)	37.45 (.000)
CP + VF + CR vs. CP + VF	1.00 (.322)	38.09 (.000)	0.53 (.592)
CP + VF + CR vs. Control	0.90 (.346)	24.60 (.000)	4.06 (.019)
CP + VF vs. Control	0.02 (.902)	20.61 (.000)	1.82 (.167)

Note. AF = audience feedback; CP = Cognitive preparation; VF = video feedback; CR = cognitive review; SAR = State Anxiety Rating; PSP = Perception of Speech Performance; PCNE-P = Probability and Cost of Negative Evaluation questionnaire–Probability items.

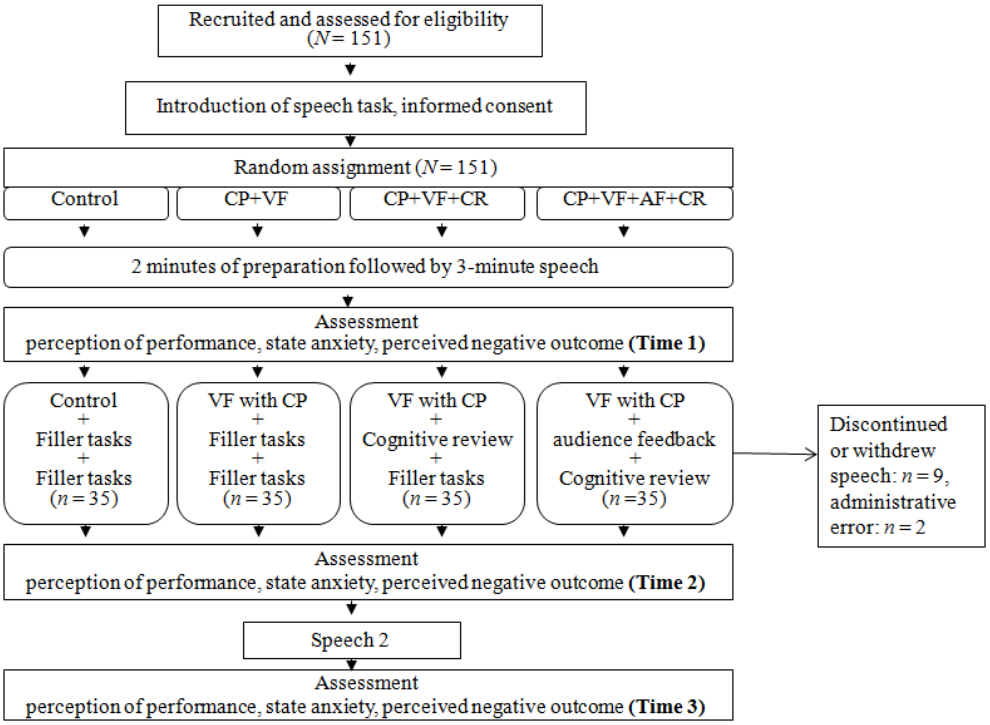

Figure 1. CONSORT diagram of participation.
Note. CP = cognitive preparation; VF = video feedback; AF = audience feedback; CR = Cognitive Review.

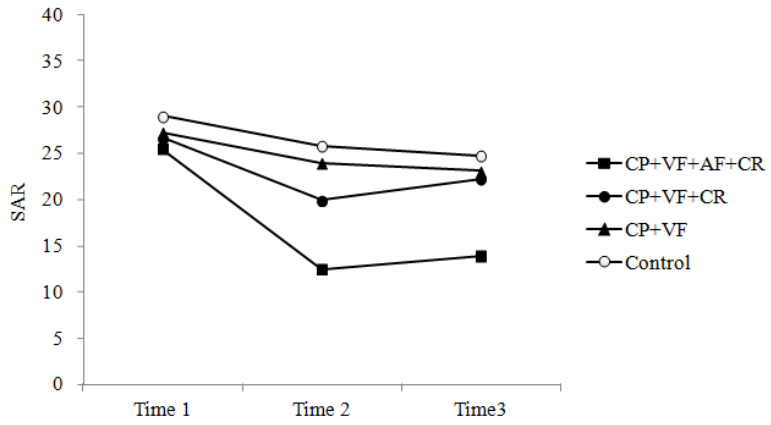

Figure 2. SAR scores by condition and time.

Note. SAR = State Anxiety Rating; CP = cognitive preparation; VF = video feedback; AF = audience feedback; CR = cognitive review; Time1 = after Speech 1; Time2 = after feedback or filler tasks; Time3 = after Speech 2.

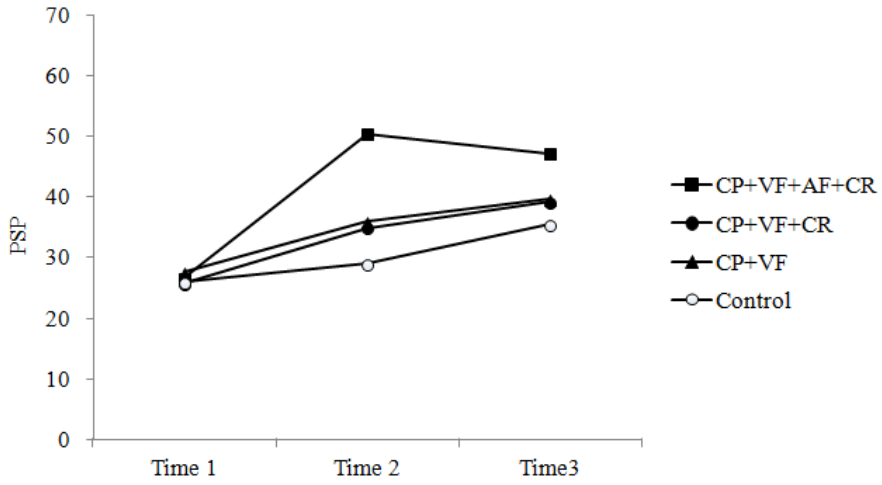

Figure 3. PSP scores by condition and time.

Note. PSP = Perception of Speech Performance; CP = cognitive preparation; VF = video feedback; AF = audience feedback; CR = cognitive review; Time1 = after Speech 1; Time2 = after feedback or filler tasks; Time3 = after Speech 2.

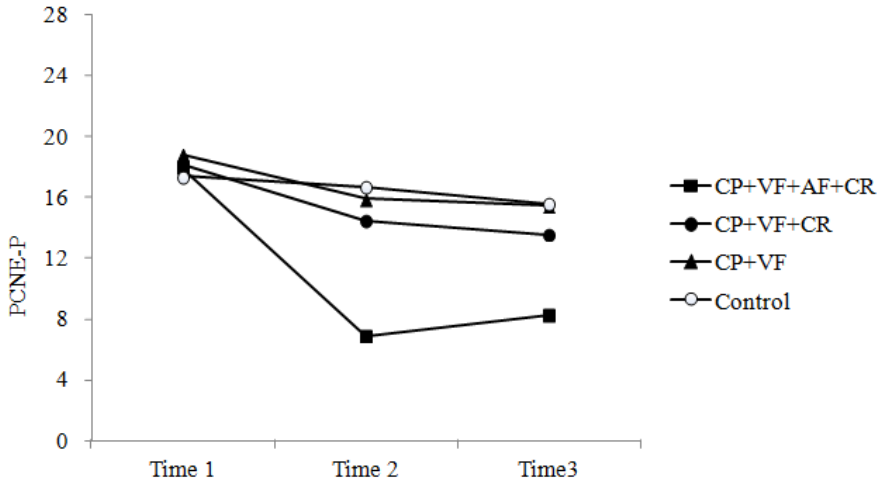

Figure 4. PCNE-P scores by condition and time.

Note. PCNE-P: Probability and Cost of Negative Evaluation questionnaire-Probability items; CP = cognitive preparation; VF = video feedback; AF = audience feedback; CR = cognitive review; Time1 = after Speech 1; Time2 = after feedback or filler tasks; Time3 = after Speech 2.

Highlights

- Added audience feedback (AF) to video feedback with cognitive preparation (CP+VF)
- AF plus CP+VF and cognitive review (CR) had superior effects on anxiety reduction
- AF plus CP+VF and CR produced superior effects on reducing negative perceptions
- The effects of AF plus CP+VF and CR generalised to a second speech
- Adding AF may enhance the effects of existing video feedback protocols