Journal of Contextual Behavioral Science 12 (2019) 47–54

Contents lists available at ScienceDirect

Journal of Contextual Behavioral Science

journal homepage: www.elsevier.com/locate/jcbs

# A pilot of acceptance and commitment therapy for public speaking anxiety delivered with group videoconferencing and virtual reality exposure☆

Erica K. Yuen[a,*], Elizabeth M. Goetter[b], Michael J. Stasio[a], Philip Ash[a], Briana Mansour[a], Erin McNally[a], Morgan Sanchez[a], Erica Hobar[a], Simone Forte[a], Kristin Zulaica[a], Jordan Watkins[a]

[a] Department of Psychology, University of Tampa, Tampa, FL, USA
[b] Massachusetts General Hospital, Boston, MA, USA

ARTICLE INFO

*Keywords:*
Acceptance and commitment therapy
Telehealth
Videoconferencing
Virtual reality
Public speaking
Social anxiety

ABSTRACT

Two pilot studies (N = 11; N = 15) assessed the feasibility and efficacy of a weekly 6-session ACT group videoconferencing intervention for public speaking anxiety with participants in separate physical locations. Both studies found significant improvements in self-reported social anxiety symptoms from pre-treatment to follow-up, with high levels of patient satisfaction. Results provide support for group videoconferencing as a viable format for delivering behavioral treatments including acceptance-based interventions. The second study also found significant improvements in behavioral performance and supported the feasibility and utility of videotaped virtual audiences for homework exposure exercises. No significant differences in anxiety levels were experienced during in vivo homework exposures compared to virtual homework exposures. Practically, clinicians are encouraged to pay particular attention to optimizing physiological arousal during exposures and to consider technological and ethical factors of these formats.

## 1. Introduction

Social anxiety disorder (SAD) is the third most common psychological disorder in the United States, with a lifetime prevalence rate of approximately 12% (Kessler et al., 2005), and public speaking anxiety (PSA) is the most common fear among individuals with SAD (Mannuzza et al., 1995). However, as many as 80% of individuals with SAD do not receive treatment (Grant et al., 2005). Of those who do seek treatment, most have experienced symptoms for numerous years prior to initiating treatment (Wang et al., 2005). SAD and PSA represent crucial targets for telemental health dissemination efforts, given their high prevalence rate, the variety of effective treatment methods available, and their core symptoms that may exacerbate the very problem of underutilization of treatment (e.g., fear of negative evaluation from mental healthcare providers and others for seeking professional help). Videoconferencing interventions reduce logistical barriers, make specialized treatment providers more accessible, and may also mitigate the fear of face-to-face interactions and the perceived stigma associated with physically presenting to a mental health clinic (Yuen, Goetter, Herbert, & Forman, 2012).

There is preliminary support for the use of videoconferencing to deliver *individual* therapy for a range of disorders (Backhaus et al., 2012), but less is known about *group* interventions for anxiety delivered through videoconferencing. Several studies provide preliminary support for using group videoconferencing interventions for various conditions, however most of these studies' methodologies involved delivering group treatment to participants all located in the *same* physical room, with only the therapist located in a separate room (Frueh, Henderson, & Myrick, 2005; Morland et al., 2010; Morland, Hynes, Mackintosh, Resick, & Chard, 2011). In another study, patients were located across just two separate rooms, with the therapist in one of them (Paylo, Schopmeyer, & McQuaid, 2012). These formats have the benefit of allowing in-person communication amongst participants, however requires all participants to be physically present at the same location, thus not harnessing the full potential of remote treatments.

Recent technological advances have made high-quality technology for group videoconferencing, with capabilities for participants in separate physical locations, readily available to the general public. Few studies have explored group videoconferencing with each participant in a separate physical location, but they have found preliminary support for the feasibility of this format (Kahtri, Marziali, Tchernikov, & Shepherd, 2014; Tsaousides, D'Antonio, Varbanova, & Spielman, 2014).

☆ This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.
* Correspondence to: Department of Psychology, Box Q, University of Tampa, 401W Kennedy Blvd, Tampa, FL 33606, USA.
*E-mail address:* eyuen@ut.edu (E.K. Yuen).

https://doi.org/10.1016/j.jcbs.2019.01.006
Received 24 August 2018; Received in revised form 10 January 2019; Accepted 23 January 2019

There are numerous advantages to group interventions including potentially decreased costs, the availability of social support, and the ability to engage in behavioral social exercises that require multiple individuals, which is often a component of treatment for SAD and PSA (Heimberg & Becker, 2002).

In addition, few published studies have explored the use of *acceptance-based interventions* delivered via this group videoconferencing modality. Acceptance-based approaches, such as acceptance and commitment therapy (ACT), promote value-based behaviors and psychological flexibility while deemphasizing the importance of symptom reduction (Herbert & Forman, 2013). Past studies suggest that in-person acceptance-based therapeutic approaches are effective in reducing social anxiety symptoms (Craske et al., 2014; Dalrymple & Herbert, 2007; Kocovski, Fleming, Hawley, Huta, && Antony, 2013), including PSA (England et al., 2012). Research has also found improvements in observer-rated performance for in-person acceptance-based interventions for public speaking anxiety (Glassman et al., 2016).

Furthermore, given that acceptance-based therapy makes strong use of experiential exercises (e.g., to reduce avoidance and increase awareness of language traps), it is important to examine whether these activities can be effectively conducted through the videoconferencing modality. Preliminary research is scarce but promising thus far for delivering *individual* acceptance-based therapy through videoconferencing for social anxiety disorder (Yuen et al., 2013) and OCD (Goetter, Herbert, Forman, Yuen, & Thomas, 2014). However, we are unaware of any published studies that explore group acceptance-based therapy through videoconferencing.

In sum, there is a relative dearth of research on the feasibility and effectiveness of group-based videoconferencing therapy utilizing an acceptance-based approach for SAD and PSA. This represents an important area for further study given the prevalence of public speaking anxiety (clinical and subclinical populations), the aforementioned advantages of group therapies, and the increasing use of computer-based interventions for mental health problems (Backhaus et al., 2012). A group videoconferencing format poses additional challenges for acceptance-based therapy, which makes use of frequent experiential exercises and communication between group participants.

The primary aim of our first pilot study was to examine the feasibility and efficacy of a brief ACT intervention for public speaking anxiety delivered through group videoconferencing whereby participants are each in different physical locations, without in-person contact with the therapist or other participants during sessions. We hypothesized that (1) significant self-reported pre- to post-treatment reductions in public speaking anxiety would be observed, (2) self-reported reductions in public speaking anxiety would be maintained at 3-month follow-up, and (3) observer-rated public speaking performance would improve from pre- to post-treatment.

## 2. Study 1

### 2.1. Method

#### 2.1.1. Participants

Participants were 11 adults ($M$ = 40.91; $SD$ = 11.30) from the Tampa Bay area who reported significant public speaking anxiety (see Table 1 for demographics). Participants were recruited from the community via flyers, online advertisements (e.g., Craigslist), and email notices to local public speaking groups (e.g., Toastmasters). Participants on psychotropic medication (18%) were maintained at a stable dosage. All participants reported being "very comfortable" with computers, although most participants (64%) did not regularly videoconference.

#### 2.1.2. Measures

Social anxiety disorder was assessed via a licensed clinical psychologist using the *Mini International Neuropsychiatric Schedule* (M.I.N.I.; Sheehan et al., 1998), which is a widely used brief structured interview for screening and diagnosing DSM-IV Axis I disorders. To measure level of public speaking anxiety specifically, participants completed the *Personal Report of Confidence as a Speaker* (PRCS – Short Form; Hook, Smith, & Valentiner, 2008), a 12-item self-report measure with good validity and internal consistency. The PRCS assesses both behavioral (e.g., trembling) and affective (e.g., fear) responses to public speaking scenarios. Participants also completed the *Self-Statements During Public Speaking* (SPSS; Hofmann & DiBartolo, 2000), a 10-item self-report measure with good validity and internal consistency. The SSPS consists of two subscales for positive (SSPS-P) and negative (SSPS-N) cognitions experienced in public speaking scenarios. To measure psychological flexibility, which refers to one's ability to either persist or desist in particular behaviors based on personally chosen values rather than by the distress such behaviors may evoke, participants completed *the Acceptance and Action Questionnaire-II* (AAQ-II; Bond et al., 2011), a seven-item self-report with good convergent and discriminant validity. Self-reports were completed at baseline (1 month prior to treatment), pre-treatment, post-treatment, and 3-month follow-up. Participants also completed a satisfaction survey at post-treatment, which contained items about satisfaction levels, feasibility of treatment delivery method, perceived improvement, and technical difficulties.

Participants also completed a Behavioral Assessment Test (BAT) at pre- and post-treatment to assess public speaking anxiety and public speaking skills. The BAT protocols for this study are based on the BAT protocols in previously published treatment outcome studies of social anxiety (e.g., Dalrymple & Herbert, 2007). During the BAT, participants were given a random topic and asked to deliver an impromptu speech in front of a small audience (2 research assistants) while being videotaped. From the participants' perspective, the topic appeared to be chosen at random (slip of paper drawn from a cup), however all participants received the same topics. Half the participants received the topic "Activities to do in the local area" at pre-treatment and "Description of an ideal vacation" at post-treatment. The other half of the participants received the same topics but with the order reversed at pre- and post-treatment. While delivering the speech, participants had the option of ending their speech at any time by holding up a "STOP" card, with a maximum time limit of 10 min. Participants were asked to rate their anxiety level using the 100-point Subjective Units of Discomfort Scale (SUDS) right before their speech, immediately after, and at their highest

**Table 1**
Participant demographics.

| | STUDY 1 ($n$ = 11) | STUDY 2 ($n$ = 15) |
|---|---|---|
| **Gender** | | |
| Male | 45% | 40% |
| Female | 55% | 60% |
| **Race/Ethnicity** | | |
| Caucasian | 64% | 67% |
| Asian | 18% | 20% |
| Black / African American | 9% | 7% |
| Hispanic / Latino | 9% | 13% |
| **Education** | | |
| Some college | 9% | 13% |
| College Degree | 45% | 60% |
| Graduate Degree | 45% | 27% |
| **Employment** | | |
| No income | 9% | 7% |
| Part-time | 9% | 0% |
| Full-time | 82% | 93% |
| **Marital Status** | | |
| Single | 27% | 13% |
| Married | 73% | 67% |
| Divorced | 0% | 20% |
| **Comorbidity** | | |
| Comorbid mood disorder | 9% | 13% |
| Comorbid anxiety disorder | 9% | 7% |

level of anxiety. The videotaped speeches were then rated by two independent evaluators (undergraduate research assistants) who were blind to time point (pre- or post-treatment). Speeches were rated based on a 5-point scale (ranging from Poor to Excellent) for verbal skills, nonverbal skills, paralinguistic skills (e.g., volume, speed, tone, articulation), and overall performance. Evaluators also rated how anxious the participants appeared while speaking on a 5-point scale (5 = extremely anxious; 1 = not anxious). Intraclass correlation coefficients were computed to assess the degree of interrater reliability between the two independent evaluators. Estimated reliabilities ($n$ = 20 for each category) were as follows: *Appearance of Anxiety*, 0.70, with 95% CI (0.37, 0.87); *Nonverbal Skills*, 0.70, with 95% CI (0.39, 0.87); *Paralinguistic Skills*, 0.72, with 95% CI (0.41, 0.89); *Verbal Skills*, 0.74, with 95% CI (0.44, 0.89); and *Overall Public Speaking Skills*, 0.47, with 95% CI (0.40, 0.75). Taken together, findings revealed relatively consistent intraclass correlations in the 0.70–0.74 range, with the exception of *Overall Public Speaking Skills*, which was lower.

#### 2.1.3. Procedures

Twelve interested individuals passed a phone screen and were invited to the research office for a structured clinical interview (M.I.N.I.) to assess for eligibility. Inclusion criteria included clinical or subclinical SAD with significant fear of public speaking. Exclusion criteria included psychotic symptoms, acute suicide potential, history of substance dependence within the past six months, intellectual disability, and pervasive developmental disorder. All individuals met criteria for clinical SAD. One individual decided not to participate due to family obligations. Thus, 11 participants were enrolled and completed online baseline self-report questionnaires. After a 1-month waiting period, participants then completed the same online self-report questionnaires at pre-treatment to control against spontaneous remission or other threats to internal validity. Participants then attended an in-person meeting with a research assistant where they received a tutorial in using the videoconferencing program and completed the pre-treatment BAT. At the end of the sixth and final session, participants completed the same self-report questionnaires and the post-treatment BAT. Finally, they completed the online self-report questionnaires one last time at the 3-month follow-up point. Participants did not receive any compensation for participation in study procedures.

Participants were divided into two public speaking groups ($n$ = 5; $n$ = 6), both identical in format. Both public speaking groups met weekly through a videoconferencing program for 90 min for a total of 6 sessions each. In order to ensure adequate Internet connection and minimize technological disruptions to the sessions, we decided to provide participants with computers, webcams, and Ethernet cords at our research location, despite how this would limit ecological validity. Each participant arrived at the research office at the designated group time and was seated in a private onsite room by themselves in front of a laptop or desktop with a built-in or external webcam. Participants were kept separate and did not have any in-person contact with each other, although they were aware that other study participants were in the same building. The videoconferencing software used was VSee, which is a secure, FDA-registered, and HIPAA-compliant software program. Each participant logged onto VSee and was able to view and speak to all other participants and their clinician who was a licensed clinical psychologist. An advanced undergraduate student sat next to the clinician to provide assistance during the session. Each individual's computer screen contained an array of windows (each window containing a separate person) which could be enlarged, reduced, or moved as desired. The clinician and student assistant were in the same room as each other and appeared under one window on the computer screen. Participants could also view a group chat box and a private chat box with the clinician.

The ACT intervention emphasized the principles that (a) experiencing public speaking anxiety is normal, and (b) one is able to speak well in public even if experiencing high levels of anxiety. It incorporated acceptance-based strategies for coping with anxiety (Eifert & Forsyth, 2005; Hayes, Strosahl, & Wilson, 2016; Herbert, Forman, & Dalrymple, 2009), as well as exposure exercises in the form of public speaking practice. Session 1 included content on creative hopelessness, goals and values, and concepts of willingness. Sessions 2 and 3 included a series of defusion exercises that involved learning to distance from anxious cognitions and recognizing that "thoughts are just thoughts," as well as further discussion of willingness. Session 4 introduced the topic of mindfulness, and participants engaged in mindfulness meditation exercises to practice the skills of awareness, acceptance, attention-refocusing, and self-compassion. Session 5 reinforced the concepts of the previous sessions and emphasized committed action. Session 6 emphasized relapse prevention and a reflection on participants' personal improvements.

Beginning with Session 2, each participant completed videoconferencing exposures during every session. The participant delivering the speech was instructed to stand in front of their laptop (containing a built-in web camera) and make eye contact with the other participants on their computer screen. Participants were instructed to practice acceptance-based strategies before and as they delivered their speeches. Examples of in-session exposure exercises included: delivering an impromptu speech based on a random topic drawn from a hat, debating a particular side of a controversial issue, telling an embarrassing story, and speaking to an audience that is displaying distracting behaviors (e.g., yawning, stretching, checking phones, standing up to leave). In addition, the participants acting as audience members were encouraged to ask challenging questions to the speaker at the end of the speech.

At the end of each session, participants were given individualized homework assignments to practice the acceptance-based strategies they learned and to engage in at least three public speaking exposures during the week. Example exposures included delivering a presentation at work, participating in a meeting, and telling a story to acquaintances. Participants were instructed to record their exposure exercises on a monitoring form, and then email it to the clinician before the next session.

#### 2.1.4. Data analytic strategy

Treatment outcome analyses for self-reported public speaking anxiety and psychological flexibility were conducted using repeated measure ANOVAs across pre-treatment, post-treatment, and 3-month follow-up; Significant omnibus tests were followed up with Tukey's LSD. Outcome analyses for self-reported public speaking state anxiety and observer-rated public speaking performance (during the BATs) were conducted used paired sample $t$-tests (pre- vs. post-treatment). Descriptive statistics were calculated for responses on the satisfaction survey. Because this was a pilot study examining the preliminary feasibility, acceptability and efficacy of an innovative treatment delivery method, we were mindful of balancing concerns about Type I error with those regarding Type II error. Therefore, we elected not to adjust alpha to control for experiment-wise Type I error.

### 2.2. Results

Significant differences in public speaking anxiety and psychological flexibility were not found from baseline (1 month prior to treatment) to pre-treatment for the self-report measures: PRCS – Short Form [$t$(10) = 0.94, $p$ = .37], SSPS-P [ $t$(9) = -0.84, $p$ = .42], SSPS-N [$t$(9) = -0.27, $p$ = .79], AAQ-II, [$t$(9) = -1.39, $p$ = .20], indicating that the participants' public speaking anxiety and psychological flexibility did not improve in the absence of treatment. One participant dropped out of the study after session 2 due to lack of time and did not complete post-treatment measures, which left 10 treatment completers for the completer analyses described below.

#### 2.2.1. Self-report measures

Repeated-measures ANOVAs found significant results with large

**Table 2**
Means, standard deviations, and effect sizes.

| | Study 1 | | | Study 2 | | |
|---|---|---|---|---|---|---|
| **Measure** | ***M*** | ***SD*** | **Effect Size (Cohen's *d*)** | ***M*** | ***SD*** | **Effect Size (Cohen's *d*)** |
| PRCS – Short Form | | | | | | |
| Baseline | 8.3 | 3.20 | | 7.27 | 2.74 | |
| Pre-treatment | 8.1 | 3.25 | | 6.60 | 2.64 | |
| Post-treatment | 2.5 | 2.01 | 1.72 | 3.80 | 2.73 | 1.06 |
| Follow-up | 2.8 | 3.01 | 1.63 | 2.13 | 2.03 | 1.69 |
| SSPS-P | | | | | | |
| Baseline | 12.5 | 6.87 | | 14.33 | 5.22 | |
| Pre-treatment | 13.5 | 6.31 | | 14.07 | 5.54 | |
| Post-treatment | 21.1 | 3.28 | 1.20 | 19.60 | 3.70 | 1.00 |
| Follow-up | 20.2 | 4.59 | 1.06 | 20.27 | 3.95 | 1.12 |
| SSPS-N | | | | | | |
| Baseline | 10.6 | 5.78 | | 9.07 | 5.15 | |
| Pre-treatment | 11.1 | 5.55 | | 8.93 | 5.11 | |
| Post-treatment | 3.7 | 4.11 | 1.33 | 4.53 | 3.02 | 0.86 |
| Follow-up | 3.7 | 4.40 | 1.33 | 4.13 | 3.48 | 0.94 |
| AAQ-II | | | | | | |
| Baseline | 20.3 | 10.39 | | 20.13 | 7.61 | |
| Pre-treatment | 21.4 | 9.86 | | 18.47 | 6.53 | |
| Post-treatment | 12.9 | 5.53 | 0.86 | 16.27 | 6.22 | 0.34 |
| Follow-up | 14.0 | 5.73 | 0.75 | 13.80 | 5.51 | 0.72 |
| BAT Pre-Speech SUDS | | | | | | |
| Pre-treatment | 41.5 | 15.28 | | 39.20 | 20.01 | |
| Post-treatment | 21.9 | 9.34 | 1.28 | 20.97 | 15.44 | 0.91 |
| BAT Post-Speech SUDS | | | | | | |
| Pre-treatment | 45.5 | 28.03 | | 45.20 | 22.31 | |
| Post-treatment | 15.6 | 7.90 | 1.07 | 21.97 | 17.51 | 1.04 |
| BAT peak SUDS | | | | | | |
| Pre-treatment | 61.2 | 23.59 | | 55.83 | 20.39 | |
| Post-treatment | 29.1 | 7.33 | 1.36 | 40.33 | 25.53 | 0.76 |
| BAT Speech Length (seconds) | | | | | | |
| Pre-treatment | 163 | 138.89 | | 189.27 | 180.65 | |
| Post-treatment | 198 | 144.88 | 0.25 | 145.93 | 105.87 | 0.24 |
| IE-rated verbal skills | | | | | | |
| Pre-treatment | 4.0 | 0.88 | | 3.43 | 0.96 | |
| Post-treatment | 4.0 | 0.53 | 0 | 4.00 | 0.68 | 0.59 |
| IE-rated nonverbal skills | | | | | | |
| Pre-treatment | 3.3 | 0.86 | | 3.07 | 0.86 | |
| Post-treatment | 3.3 | 0.86 | 0 | 3.53 | 0.69 | 0.53 |
| IE-rated paralinguistic skills | | | | | | |
| Pre-treatment | 3.5 | 0.67 | | 3.23 | 0.73 | |
| Post-treatment | 3.6 | 0.88 | 0.15 | 3.70 | 0.68 | 0.64 |
| IE-rated overall performance | | | | | | |
| Pre-treatment | 3.5 | 0.72 | | 3.13 | 0.90 | |
| Post-treatment | 3.7 | 0.71 | 0.28 | 3.80 | 0.49 | 0.74 |
| IE-rated appearance of anxiety | | | | | | |
| Pre-treatment | 2.6 | 0.88 | | 2.90 | 1.00 | |
| Post-treatment | 2.5 | 0.80 | 0.17 | 2.27 | 0.86 | 0.63 |
| Self-reported BAT Performance | | | | | | |
| Pre-treatment | | | | 2.53 | 1.25 | |
| Post-treatment | | | | 3.47 | 0.99 | 0.75 |

effect sizes for the main public speaking anxiety self-report measures: PRCS [$F(2, 18) = 18.83$, $p < .01$], SSPS-P [$F(1.15, 10.38) = 14.89$, $p < .01$], and SSPS-N [$F(2, 18) = 13.64$, $p < .01$] (see Table 2). Tukey's LSD post hoc tests revealed significant decreases in public speaking anxiety from pre-treatment to post-treatment ($d$ = 1.20–1.72), and from pre-treatment to follow-up ($d$ = 1.06–1.63) for these measures. However, Tukey's LSD post hoc tests did not find significant changes from post-treatment to follow-up.

A repeated-measures ANOVA also found significant results with large effect sizes for the AAQ-II, $F(1.18, 10.60) = 5.40$, $p = .037$. Tukey's LSD post hoc tests revealed significant decreases in psychological inflexibility (i.e., experiential avoidance) between pre- to post-treatment ($d$ = 0.86), and approached significance ($p = .051$; $d$ = 0.75) for pre-treatment to follow-up.

#### 2.2.2. BAT

Paired-samples $t$-tests found significant reductions in all self-reported public speaking anxiety levels from the pre-treatment BAT to post-treatment BAT: pre-SUDS [$t(9) = 3.46$, $p < .01$, $d = 1.28$], post-SUDS [$t(9) = 3.25$, $p = .01$, $d = 1.07$], and peak-SUDS [$t(9) = 3.85$, $p < .01$, $d = 1.36$]. However, the length of time of the participants' speech did not significantly change from the pre-treatment BAT to the post-treatment BAT, $t(9) = -0.72$, $p = .49$.

Paired-sample $t$-tests did not find significant differences in the independent evaluator ratings of the participants' performances on the BAT from pre- to post-treatment: verbal skills [$t(9) = 0$, $p = 1.00$], nonverbal skills [$t(9) = 0$, $p = 1.00$], paralinguistic skills [$t(9) = -0.31$, $p = .764$], overall performance [$t(9) = -0.80$, $p = .443$], and appearance of anxiety, $t(9) = 0.42$, $p = .685$.

#### 2.2.3. Satisfaction survey

Participants reported high levels of satisfaction with the intervention (70% completely; 30% mostly satisfied). Participants also reported that the intervention increased their ability to cope with public speaking anxiety (80% strongly agree; 20% agree), improved their public speaking skills (30% strongly agree; 50% agree; 20% neutral), and decreased their avoidance of public speaking situations (20% strongly agree; 30% agree; 20% neutral; 20% disagree; 10% strongly disagree). All participants (100%) indicated they would recommend the intervention to a friend.

Participants thought that the group videoconferencing format was "very" (60%) or "fairly" (40%) easy to use. Most thought that the anxiety experienced during in-session videoconferencing exposures was similar to in-person speeches (70% agree; 10% neutral; 20% disagree). The most common technical problems were difficulty hearing other participants speak (10% often; 50% sometimes) and hearing the echo of their own voice (10% almost always; 20% often; 40% sometimes). Recommendations from participants to improve the intervention included decreasing audio problems, increasing the number of sessions, and incorporating in-person sessions.

### 2.3. Discussion

This pilot study is among the first to examine a *group* acceptance-based videoconferencing intervention whereby in-session exposure exercises were employed and each participant was seated in a *separate* physical location with their own video feed. Results revealed large effect sizes and significant reductions in public speaking anxiety from pre- to post-treatment and from pre-treatment to 3-month follow-up. In addition, psychological flexibility significantly improved from pre- to post-treatment and these gains were maintained at 3-month follow-up. Furthermore, participants reported high levels of satisfaction with the intervention. Interestingly, independent evaluators' ratings of participants' public speaking performance did not improve from pre- to post-treatment, despite the majority of participants reporting subjective improvements. Overall, this first pilot study supports the feasibility of an acceptance-based intervention delivered via group videoconferencing.

## 3. Study 2

Exposure is a key component to behavioral therapies for SAD and PSA and it is necessary to ensure that patients continue to practice exposure between sessions to achieve maximal, sustained benefit from treatment (Edelman & Chambless, 1995). In the first study, it was noted that some participants had difficulty finding opportunities to engage in exposure exercises outside of session. Patients with any variety of anxiety disorders may experience difficulty engaging in self-guided exposure exercises, but this may be a particular problem for individuals with fears that are not easily recreated (e.g., public speaking anxiety to

a large crowd) or for individuals who may be physically isolated (e.g., those working from home, or living in a rural area). Furthermore, this may represent precisely the subset of individuals for whom technology-mediated treatments may be especially beneficial.

Virtual reality (VR) is one possible solution to the problem of insufficient exposure therapy practice and may be a particularly useful alternative for situational exposures that are difficult to recreate oneself. VR is an artificial environment that is presented to the user in such a way to appear real. VR is effective for numerous anxiety related conditions (Powers & Emmelkamp, 2008). VR has also been used successfully to treat SAD (Anderson et al., 2013; Klinger et al., 2005; Yuen et al., 2013) and PSA (Harris, Kermmerling, && North, 2002; Wallach, Safir, & Bar-Zvi, 2009). Fortunately, anxious individuals who utilize VR exhibit physiological arousal levels similar to what is experienced in live, face-to-face experiences (Slater, Pertaub, Baker, & Clark, 2006), and VR may be even more effective compared to in vivo exposure in some cases (Powers & Emmelkamp, 2008). Historically, a barrier to the utilization of VR is its monetary cost (Cottraux, 2005; Segal, Bhatia, & Drapeau, 2011), which may be one of the biggest reasons that VR has not been more widely adapted. As such, more studies are needed to investigate the feasibility and acceptability of interventions using low-cost VR exposure technologies.

The primary aim of the second pilot study was to examine the same brief ACT group videoconferencing intervention in Study 1 with the added component of virtual reality exposure for homework. As a cost-effective alternative to expensive VR equipment, participants were given access (via Internet web link) to videos of young adult audiences engaged in a variety of typical audience behaviors (nodding, making eye contact, looking bored, yawning, etc.). Foremost, we wanted to examine the feasibility and effectiveness of videotaped virtual audiences as a cost-effective remote method for increasing exposures between sessions. We hypothesized that: (1) significant self-reported pre- to post-treatment reductions in public speaking anxiety would be observed, (2) reductions in self-reported public speaking anxiety would be maintained at 3-month follow-up, and (3) public speaking performance would improve from pre- to post-treatment.

### 3.1. Method

#### 3.1.1. Participants

Recruitment methods were the same as in Study 1. Participants were 15 adults ($M$ = 45.4 years old; $SD$ = 8.0) with significant public speaking anxiety (see Table 1 for demographics). Participants on psychotropic medication (13%) were maintained at a stable dosage. An additional 13% of participants reported having a prescription for anti-anxiety medication (e.g., benzodiazepines, anxiolytics) to take as needed, but agreed to refrain from taking the medications during treatment sessions and public speaking exercises. Most participants (83%) reported that they did not regularly videoconference.

#### 3.1.2. Procedures

Eligibility procedures and inclusion/exclusion criteria were the same as in Study 1. All 15 interested individuals who were administered the M.I.N.I met inclusion criteria (60% clinical SAD; 40% subclinical), reporting public speaking anxiety as their primary concern. The clinical intervention and procedures were similar to Study 1. The same licensed clinical psychologist facilitated the sessions, with 1 or 2 advanced undergraduate students assisting with each session. There were three groups, each consisting of four to six participants. Two participants were married and thus had in-person contact with each other outside of sessions.

An additional clinical component for Study #2 was the virtual exposure exercises assigned for homework after sessions 2–5. For each weekly assignment, participants downloaded a 7–10-min video file and played it on their computer in a quiet, private location. Each video included a brief narrative review of the major ACT concepts discussed in the prior session, and then instructed participants to deliver 2–3 short speeches to a virtual audience while practicing the acceptance-based techniques. Participants were given a specific topic for each exercise (e.g., “What is important to you in life?”; “If I could change anything in the world, I would change…”). In addition, participants were taught interoceptive exposure exercises during session 3 (e.g., holding breath, wearing warm clothing, jumping up and down) and instructed to use this method to induce anxiety sensations before delivering their speech to the virtual audience, if their anxiety level was initially low.

To create the virtual audience, researchers filmed classes of undergraduate students staring at the camera and pretending to listen to a speech. The virtual audience members engaged in a variety of typical audience behaviors, sometimes nodding and looking interested, sometimes acting solemn with blank expressions on their face, sometimes checking their watch or cellphones, other times looking sleepy and bored, and other times whispering to and laughing with each other. At the end of each video, participants were reminded to engage in at least 3 public speaking in vivo exposures before the next session and record the exposures on their monitoring form.

#### 3.1.3. Measures

All assessments (self-report measures and the BAT) administered to participants were the same as in Study 1, with the same timetable. There were three additional assessment components. First, a few questions about the virtual exposure exercises were added to the satisfaction survey. Secondly, for each in-session or between-session exposure exercise completed, participants rated their anxiety level on a scale from 1 to 10. For the in-session videoconferencing exposures, the participants sent their anxiety levels to the clinicians through a private message via the videoconferencing program. For the homework exposures (both in vivo and virtual exposures), participants recorded their anxiety levels on a weekly monitoring form. Participants turned in 83% of their monitoring forms, which contained their anxiety ratings for their homework exposures, both in vivo and virtual (see Table 3). There was an average of 2.12 ($SD$ = 1.02) in vivo exposure exercises reported on each form. Of the monitoring forms turned in, participants completed and reported anxiety levels for the in vivo exposures 92% of the time, and for the virtual exposures 86% of the time.

Secondly, participants were asked to rate their own performance on a 5-point scale (1 = *performed poorly* to 5 = *performed very well*) at the end of the BAT. All other BAT procedure were the same. Independent evaluators (one post-graduate and one undergraduate research assistant), blind to time point, watched videos of the speeches and rated the participants' performance. Interrater reliability was assessed using intraclass correlation coefficients for video ratings averaged by group ($N$ = 30 in each analysis). Results were as follows: verbal skills = 0.82, with 95% CI (0.61, 0.91); nonverbal skills = 0.75, with 95% CI (0.48, 0.88); paralinguistic skills = 0.74, with 95% CI (0.46, 0.87); appearance of anxiety = 0.93, with 95% CI (0.87, 0.97); and overall public speaking skills = 0.81, with 95% CI (0.60, 0.91). Findings revealed acceptable intraclass correlation coefficients in the range of 0.75–0.93; interrater reliability for appearance of anxiety was particularly high.

#### 3.1.4. Data analytic strategy

Treatment outcome analyses for self-reported public speaking anxiety and psychological flexibility were conducted using repeated

**Table 3**
Study 2: Self-reported mean anxiety levels for exposure exercises.

| | In-Session Videoconferencing | Homework: In Vivo | Homework: Virtual |
|---|---|---|---|
| Week 2 | 4.17 ($SD$ = 1.68) | 3.28 ($SD$ = 1.11) | 3.89 ($SD$ = 1.54) |
| Week 3 | 4.41 ($SD$ = 1.84) | 4.83 ($SD$ = 1.55) | 4.12 ($SD$ = 1.80) |
| Week 4 | 5.78 ($SD$ = 1.59) | 4.33 ($SD$ = 1.86) | 3.90 ($SD$ = 1.60) |
| Week 5 | 5.20 ($SD$ = 2.70) | 2.85 ($SD$ = 1.76) | 3.23 ($SD$ = 1.63) |

measure ANOVAs across pre-treatment, post-treatment, and 3-month follow-up; Significant omnibus tests were followed up with Tukey's LSD. Outcome analyses for self-reported public speaking state anxiety and public speaking performance were conducted used paired sample *t*-tests (pre- vs. post-treatment). To compare self-reported anxiety among the in-session videoconferencing exposures, the in vivo homework exposures, and the virtual homework exposures, a repeated-measures ANOVA was conducted for each session (for sessions 2–5); Significant omnibus tests were followed up with Tukey's LSD. Finally, descriptive statistics were calculated for responses on the satisfaction survey. We again elected not to adjust alpha to control for experiment-wise Type I error.

### 3.2. Results

There were no drop-outs, as all participants who began the intervention also completed the final session. Significant differences in public speaking anxiety and psychological flexibility were not found from baseline (1 month prior to treatment) to pre-treatment for the self-report measures: PRCS – Short Form [$t(15) = 1.92$, $p = .08$], SSPS-P [ $t(15) = 0.26$, $p = .80$], SSPS-N [$t(15) = 0.19$, $p = .85$], AAQ-II, [$t(15) = 1.40$, $p = .18$]. This indicates that the participants' public speaking anxiety and psychological flexibility did not improve in the absence of treatment.

#### 3.2.1. Self-report measures

Repeated-measures ANOVAs found significant results with large effect sizes for the main public speaking anxiety self-report measures: PRCS [$F(2, 28) = 27.50$, $p < .01$], SSPS-P [$F(1.31, 18.27) = 20.29$, $p < .01$], and SSPS-N [$F(1.30, 18.25) = 11.38$, $p < .01$] (see Table 2). Tukey's LSD post hoc tests revealed significant decreases in public speaking anxiety from pre-treatment to post-treatment, and from pre-treatment to follow-up for these measures. Post hoc tests also found significant decreases in public speaking anxiety for the PRCS from post-treatment to follow-up, indicating that participants continued to demonstrate improvement even after the intervention was over. However, post-hoc tests did not find significant changes in public speaking anxiety for the SSPS subscales from post-treatment to follow-up.

A repeated-measures ANOVA also found significant changes in psychological acceptance: AAQ-II, $F(2, 28) = 5.07$, $p = .013$. Tukey's LSD post hoc tests revealed significant improvements in psychological flexibility between pre-treatment to follow-up. Post-hoc tests did not find significant changes between pre- to post-treatment or post-treatment to follow-up.

#### 3.2.2. BAT

Paired-samples *t*-tests found significant reductions in all self-reported SUDS levels from the pre-treatment BAT to post-treatment BAT: pre-SUDS [$t(14) = 3.50$, $p < .01$], post-SUDS [$t(14) = 3.65$, $p < .01$], and peak-SUDS [$t(14) = 2.28$, $p = .039$]. The length of time of the participants' speech did not significantly change from the pre-treatment BAT to the post-treatment BAT, $t(14) = 1.36$, $p = .195$.

Paired-sample *t*-tests on the independent evaluators' ratings of the participants' BAT speeches found significant pre- to post-treatment improvement in verbal skills [$t(14) = -3.24$, $p < .01$], overall performance skills [$t(14) = -3.16$, $p < .01$], and appearance of anxiety [$t(14) = 2.31$, $p = .036$]. However, no significant pre- to post-treatment differences were found in the ratings for paralinguistic skills [$t(14) = -1.63$, $p = .126$] or nonverbal skills [$t(14) = -1.97$, $p = .068$], although the results approached significance for the nonverbal skills. Participants' opinions of their own performance significantly improved, $t(14) = -2.43$, $p = .029$.

#### 3.2.3. Comparison of anxiety levels during in-session exposures, in vivo homework exposures, and virtual homework exposures

Repeated measures ANOVAs found no significant differences in exposure exercise anxiety levels for week 2, $F(2, 16) = 1.37$, $p = .283$, or week 3, $F(2, 20) = 1.05$, $p = .370$ (see Table 3). However, significant differences in anxiety ratings were found for week 4, $F(2, 18) = 7.28$, $p < .01$, and week 5, $F(2, 18) = 8.95$, $p < .01$. Tukey's post-hoc tests found that for both weeks 4 and 5, the anxiety ratings for the in-session videoconferencing exposures were significantly higher compared to the in vivo home exposures and the virtual home exposures. However, there were no significant differences in the anxiety ratings between the in vivo homework exposures and the virtual homework exposures at any time point.

#### 3.2.4. Satisfaction survey

Participants reported high levels of satisfaction with the intervention (87% completely; 13% mostly), increased ability to cope with public speaking anxiety, (73% strongly agree; 27% agree), improved public speaking skills (47% strongly agree; 53% agree), and decreased avoidance of public speaking situations (47% strongly agree; 40% agree; 13% neutral). All participants (100%) indicated they would recommend the intervention to a friend. Almost all participants reported that the videoconferencing program was "very" (53%) or "fairly" (40%) easy to use. The most common technical problems were difficulty hearing the facilitators (7% often, 40% sometimes), difficulty hearing other participants speak (7% often; 33% sometimes), and hearing the echo of their own voice (27% sometimes). The majority of participants thought that their anxiety during in-session videoconferencing exposures was similar to their anxiety experienced when delivering speeches in person (13% strongly agree, 60% agree).

Overall, most participants thought the virtual exposure homework exercises were helpful (60% extremely, 27% moderately). Almost half the participants thought that the anxiety experienced during the virtual exercises was similar to the anxiety experienced when delivering speeches in person (13% strongly agree, 34% agree, 40% neutral, 13% disagree). Several participants reported that the virtual audience's behaviors (e.g., yawning, checking cellphone, fidgeting) was distracting and triggered anxious thoughts, while other participants commented that the anxiety was less during the virtual exercises because they knew the audience was not real.

When participants were asked an opened-ended question on what was most beneficial about the intervention, responses most commonly included an appreciation of the acceptance-based techniques to cope with anxiety (60%) and the opportunities to practice public speaking (47%). When participants were asked an open-ended question soliciting suggestions for improving the intervention, the most common recommendation was to also provide opportunities to speak in front of a live audience (33%) and to increase the number of participants and/or audience members during the in-session videoconferencing exposures (20%).

### 3.3. Discussion

As in Study 1, findings from Study 2 showed that public speaking anxiety significantly decreased from pre-treatment to follow-up, with large effect sizes. Furthermore, some gains continued even after the treatment phase ended. Some aspects of public speaking performance (overall, verbal, and appearance of anxiety) improved from pre- to post-treatment, which is consistent with the participants' opinions that their public speaking performance improved. Patient satisfaction was high. In-session videoconferencing exposures evoked anxiety levels comparable or sometimes more challenging to that of between-session in vivo exposure. There were no significant differences in self-reported anxiety levels between the virtual exposure exercises and the in vivo exposure exercises completed for homework. However, the virtual exposures provided additional opportunities to practice public speaking and acceptance-based coping techniques for their anxiety. Overall, the results demonstrate preliminary support for the utility of a brief ACT group videoconferencing intervention that employs both in-session

videoconferencing exposures and between-session virtual exposures utilizing a videotaped audience.

## 4. General discussion

These two pilot studies are among the first to provide preliminary support for an acceptance-based group videoconferencing intervention, delivered to participants in separate physical locations, that utilizes in-session experiential exercises (including exposures) and between-session virtual reality exposures. First, self-reported social anxiety symptoms significantly decreased from pre to – post treatment, with results maintained at follow-up. Secondly, results of public speaking performance is mixed. Improvements in some aspects of observer-rated performance were found for Study 2 but not for Study 1. However, most participants in both studies reported a belief that their public speaking skills improved. Thirdly, significant improvements were also found in psychological flexibility, which is the ability to engage in values-based behaviors despite internal distress or external stressors. Fourth, high levels of patient satisfaction were reported. Overall, these findings are consistent with others' results that acceptance-based behavior therapy can significantly reduce social and public speaking anxiety (e.g., Craske et al., 2014; England et al., 2012). Our findings also suggest that an ACT intervention can be successfully adapted to the group videoconferencing modality.

This research also found that low-budget virtual exposures using a videotaped audience can be effectively utilized as between-session homework exercises. Both in vivo exposures and virtual exposures led to similar amounts of induced anxiety. The results of this study are consistent with past research that has found that socially anxious individuals do experience salient anxiety when presented with virtual social stimuli (Slater et al., 2006), and that exposure to virtual social situations can lead to symptom reduction in social anxiety (Anderson et al., 2013; Klinger et al., 2005; Yuen, Herbert, Forman, Goetter, Comer et al., 2013a) and public speaking anxiety (Harris et al., 2002; Wallach et al., 2009). Virtual reality presents an opportunity for graded exposure for highly avoidant patients as well as access to potentially more practically constructed social situations. Because the high monetary costs of virtual reality equipment may impede access to this type of exposure therapy, it is important to explore low-cost options for virtual exposure. This study shows that treatment for PSA can be effectively delivered via a technology-mediated package to provide varied and effective opportunities to practice exposures.

Our conclusions are understood in the context of significant limitations. First, these were two pilot studies with a small sample size and lower power. Second, given that there was no control group, we cannot make solid causal claims. The lack of control group is partially mitigated by how analyses found no significant differences in public speaking anxiety between baseline and pre-treatment. However, it is possible that the placebo effect, socially desirable responding, or regression to the mean could account for the significant improvements seen in self-reported symptoms. Third, ecological validity is limited, as participants traveled to the research office and were provided with computers to use instead of logging in from their own homes where there may be more distractions and technical difficulties. Despite these limitations, this exploratory treatment study demonstrates preliminary support for the utility of group videoconferencing interventions whereby participants are in separate physical locations and group experiential/behavioral exercises are employed. Moreover, the high levels of patient satisfaction and decreases in anxiety demonstrate how acceptance-based therapy can successfully be remotely conducted through innovative methods such as low-cost virtual reality and group videoconferencing.

Our findings have important clinical implications for providers – group behavioral therapy for anxiety can be delivered through a comprehensive technological package. However, providers should consider certain practical aspects of a videoconference and virtual model. First, providers should anticipate and mitigate technical problems (Yuen et al., 2012). Because computer hardware and Internet connection can demonstrate variable quality and consistency (Yuen, Herbert, Forman, Goetter, Juarascio et al., 2013), future research should explore the quality of communication when participants use their own computers and Internet access at locations of their choosing. Future research should also explore the feasibility of conducting videoconferencing interventions with a larger group size, as a major strength of remote treatments is its potential to improve accessibility to evidence-based treatments. Secondly, videoconference and virtual reality formats may artificially put a ceiling on the maximum amount of anxiety an individual might feel. The question of optimal physiological arousal could be the subject of future studies employing randomized controlled designs in which one group completes in-session exposures in-person while the other group completes them through videoconferencing. Third, as with in-person group treatments, ethical issues such as protection of privacy and confidentiality need to be considered for group videoconferencing, especially if participants' images and voices are projected onto computers located outside of a professional clinical office. The clinicians should fully inform all participants of all potential privacy risks associated with group treatment and Internet-based communications and instruct patients to attend sessions from private locations.

In summary, these studies provide preliminary support for the feasibility and efficacy of utilizing a group videoconferencing and virtual reality format for acceptance-based interventions to treat anxiety. Telemental health provides a practical mechanism for reducing barriers and increasing access to psychological treatment for patients in need. Future research should also explore how communication and in-session exposure exercises can be most effectively conducted given the limits of this modality. If therapists maximize exposure efficacy and participant engagement and minimize technological disruptions, videoconference-based group therapy shows promise as an effective remotely-packaged method for delivering treatment and increasing access to psychological care.

## Declarations of interest

None.

## References


Anderson, P. L., Price, M., Edwards, S. M., Obasaju, M. A., Schmertz, S. K., Zimand, E., & Calamaras, M. R. (2013). Virtual reality exposure therapy for social anxiety disorder: A randomized controlled trial. *Journal of Consulting and Clinical Psychology, 81*, 751–760. https://doi.org/10.1037/a0033559.

Backhaus, A., Agha, Z., Maglione, M. L., Repp, A., Ross, B., Zuest, D., ... Thorp, S. R. (2012). Videoconferencing psychotherapy: A systematic review. *Psychological Services, 9*, 111–131. https://doi.org/10.1037/a0027924.

Bond, F. W., Hayes, S. C., Baer, R. A., Carpenter, K. C., Guenole, N., Orcutt, H. K., ... Zettle, R. D. (2011). Preliminary psychometric properties of the Acceptance and Action Questionnaire-II: A revised measure of psychological flexibility and acceptance. *Behavior Therapy, 42*, 676–688. https://doi.org/10.1016/j.beth.2011.03.007.

Cottraux, J. (2005). Recent developments in research and treatment for social phobia (social anxiety disorder). *Current Opinion in Psychiatry, 18*, 51–54.

Craske, M. G., Niles, A. N., Burklund, L. J., Vildarga, J. C., Saxbe, D. E., Wolitzky-Taylor, K. B., ... Lieberman, M. D. (2014). Randomized controlled trial of cognitive behavioral therapy and acceptance and commitment therapy for social phobia: Outcomes and moderators. *Journal of Consulting and Clinical Psychology, 82*(6), 1034–1048. https://doi.org/10.1037/a0037212.

Dalrymple, K. L., & Herbert, J. D. (2007). Acceptance and commitment therapy for generalized social anxiety disorder: A pilot study. *Behavior Modification, 31*, 543–568. https://doi.org/10.1177/0145445507302037.

Edelman, R. E., & Chambless, D. L. (1995). Adherence during sessions and homework in cognitive-behavioral group treatment of social phobia. *Behaviour Research and Therapy, 33*, 573–577. https://doi.org/10.1016/0005-7967(94)00068-u.

Eifert, G. H., & Forsyth, J. P. (2005). *Acceptance and commitment therapy for anxiety disorders: A practitioner's treatment guide to using mindfulness, acceptance, and values-based behavior change strategies.* Oakland, CA: New Harbinger Publications.

England, E. L., Herbert, J. D., Forman, E. M., Rabin, S. J., Juarascio, A., & Goldstein, S. P. (2012). Acceptance-based exposure therapy for public speaking anxiety. *Journal of Contextual Behavioral Science, 1*, 66–72. https://doi.org/10.1016/j.jcbs.2012.07.001.

Frueh, B. C., Henderson, S., & Myrick, H. (2005). Telehealth service delivery for persons

with alcoholism. *Journal of Telemedicine and Telecare, 11*, 372–375. https://doi.org/10.1177/1357633x0501100701.

Glassman, L. H., Forman, E. M., Herbert, J. D., Bradley, L. E., Foster, E. E., Izzetoglu, M., & Ruocco, A. C. (2016). The effects of a brief acceptance-based behavioral treatment versus traditional cognitive-behavioral treatment for public speaking anxiety: An exploratory trial examining differential effects on performance and neurophysiology. *Behavior Modification, 40*(*5*), 748–776. https://doi.org/10.1177/0145445516629939.

Goetter, E. M., Herbert, J. D., Forman, E. M., Yuen, E. K., & Thomas, J. G. (2014). An open trial of videoconference-mediated exposure and ritual prevention for obsessive-compulsive disorder. *Journal of Anxiety Disorders, 28*(*5*), 460–462. https://doi.org/10.1016/j.janxdis.2014.05.004.

Grant, B. F., Hasin, D. S., Blanco, C., Stinson, F. S., Chou, S. P., Goldstein, R. B., ... Huang, B. (2005). The epidemiology of social anxiety disorder in the United States: Results from the national epidemiologic survey on alcohol and related conditions. *Journal of Clinical Psychiatry, 66*(*11*), 1351–1361. https://doi.org/10.4088/jcp.v66n1102.

Harris, S. R., Kermmerling, R. L., & North, M. M. (2002). Brief virtual reality therapy for public speaking anxiety. *Cyber Psychology & Behavior, 5*, 543–550. https://doi.org/10.1089/109493102321018187.

Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (2016). *Acceptance and commitment therapyThe process and practice of mindful change* (Second ed.). New York, NY: The Guilford Press.

Heimberg, R. G., & Becker, R. E. (2002). *Cognitive-behavioral group therapy for social phobia.* New York, NY: Guilford Press.

Herbert, J. D., Forman, E. M., & Dalrymple, K. L. (2009). Acceptance-based behavior therapy for social anxiety disorder: A treatment manual.: Unpublished treatment manual.

Herbert, J. D., & Forman, E. M. (2013). Caution: The differences between CT and ACT may be larger (and smaller) than they appear. *Behavior Therapy, 44*(*2*), 218–223. https://doi.org/10.1016/j.beth.2009.09.005.

Hofmann, S. G., & DiBartolo, P. M. (2000). An instrument to assess self-statements during public speaking: Scale development and preliminary psychometric properties. *Behavior Therapy, 31*, 499–515. https://doi.org/10.1016/s0005-7894(00)80027-1.

Hook, J. N., Smith, C. A., & Valentiner, D. P. (2008). A short-form of the Personal Report of Confidence as a Speaker. *Personality and Individual Differences, 44*, 1306–1313. https://doi.org/10.1016/j.paid.2007.11.021.

Kahtri, N., Marziali, E., Tchernikov, I., & Shepherd, N. (2014). Comparing telehealth-based and clinic-based group cognitive behavior therapy for adults with depression and anxiety: A pilot study. *Clinical Interventions in Aging, 9*, 765–770. https://doi.org/10.2147/cia.s57832.

Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., & Walters, E. E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the national comorbidity survey replication. *Archives of General Psychology, 65*, 593–602. https://doi.org/10.1001/archpsyc.62.6.593.

Klinger, E., Bouchard, S., Legeron, P., Roy, S., Lauer, F., Chemin, I., & Nugues, P. (2005). Virtual reality therapy versus cognitive behavior therapy for social phobia: A preliminary controlled study. *CyberPsychology & Behavior, 8*, 76–88.

Kocovski, N. L., Fleming, J. E., Hawley, L. L., Huta, V., & Antony, M. M. (2013). Mindfulness and acceptance-based group therapy versus traditional cognitive behavioral group therapy for social anxiety disorder: A randomized controlled trial. *Behaviour Research and Therapy, 51*(*12*), 889–898. https://doi.org/10.1016/j.brat.2013.10.007.

Mannuzza, S., Schneier, F., Chapman, T. F., Liebowitz, M. R., Klein, D. F., & Fyer, A. J. (1995). Generalized social phobia: Reliability and validity. *Archives of General Psychiatry, 52*, 230–237. https://doi.org/10.1001/archpsyc.1995.03950150062011.

Morland, L. A., Greene, C. J., Rosen, C. S., Foy, D., Reilly, P., Shore, J., ... Frueh, B. C. (2010). Telemedicine for anger management therapy in a rural population of combat veterans with posttraumatic stress disorder: A randomized noninferiority trial. *Journal of Clinical Psychiatry, 71*, 855–863.

Morland, L. A., Hynes, A. K., Mackintosh, M. A., Resick, P. A., & Chard, K. M. (2011). Group cognitive processing therapy delivered to veterans via telehealth: A pilot cohort. *Journal of Traumatic Stress, 24*, 465–469. https://doi.org/10.1002/jts.20661.

Paylo, S. A., Schopmeyer, K. A., & McQuaid, J. R. (2012). Tele-pain management: Use of videoconferencing technology in the delivery of an integrated cognitive-behavioral and physical therapy group intervention. *Psychological Services, 9*, 200–202. https://doi.org/10.1037/a0025987.

Powers, M. B., & Emmelkamp, P. M. G. (2008). Virtual reality exposure therapy for anxiety disorders: A meta analysis. *Journal of Anxiety Disorders, 22*, 561–569. https://doi.org/10.1016/j.janxdis.2007.04.006.

Segal, R., Bhatia, M., & Drapeau, M. (2011). Therapists' perception of benefits and costs of using virtual reality treatments. *Cyberpsychology, Behavior, and Social Networking, 14*, 29–34. https://doi.org/10.1089/cyber.2009.0398.

Sheehan, D. V., Lecrubier, Y., Sheehan, K. H., Amorim, P., Janavs, J., Weiller, E., ... Dunbar, G. C. (1998). The Mini-International Neuropsychiatric Interview (M.I.N.I.): The development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *Journal of Clinical Psychiatry, 59*, 22–33.

Slater, M., Pertaub, D. P., Baker, C., & Clark, D. M. (2006). An experimental study on fear of public speaking using a virtual environment. *CyberPsychology & Behavior, 9*, 627–633. https://doi.org/10.1089/cpb.2006.9.627.

Tsaousides, T., D'Antonio, E., Varbanova, V., & Spielman, L. (2014). Delivering group treatment via videoconference to individuals with traumatic brain injury: A feasibility study. *Neuropsychological Rehabilitation: An International Journal,* 1–20. https://doi.org/10.1080/09602011.2014.907186.

Wallach, H. S., Safir, M. P., & Bar-Zvi, M. (2009). Virtual reality cognitive behavior therapy for public speaking anxiety: A randomized clinical trial. *Behavior Modification, 33*, 314–338. https://doi.org/10.1177/0145445509331926.

Wang, P. S., Lane, M., Olfson, M., Pincus, H. A., Wells, K. B., & Kessler, R. C. (2005). Twelve-month use of mental health services in the United States. *Archives of General Psychiatry, 62*, 629–640. https://doi.org/10.1001/archpsyc.62.6.629.

Yuen, E. K., Goetter, E. M., Herbert, J. D., & Forman, E. M. (2012). Challenges and opportunities in internet-mediated telemental health. *Professional Psychology: Research and Practice, 43*, 1–8. https://doi.org/10.1037/a0025524.

Yuen, E. K., Herbert, J. D., Forman, E. M., Goetter, E. M., Comer, R., & Bradley, J. (2013a). Treatment of social anxiety disorder using online virtual environments in Second Life. *Behavior Therapy, 44*, 51–61. https://doi.org/10.1016/j.beth.2012.06.001.

Yuen, E. K., Herbert, J. D., Forman, E. M., Goetter, E. M., Juarascio, A. S., Rabin, S. J., ... Bouchard, S. (2013b). Acceptance based behavior therapy for social anxiety disorder through videoconferencing. *Journal of Anxiety Disorders, 27*, 389–397. https://doi.org/10.1016/j.janxdis.2013.03.002.