Acceptance based behavior therapy for social anxiety disorder through videoconferencing

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ABSTRACT

Most individuals with social anxiety disorder (SAD) do not receive any type of treatment. Reasons include logistical barriers (e.g., geographic location, travel time), fear of stigmatization, and fear of the social interactions associated with seeking treatment. Videoconferencing technology holds great promise in the widespread delivery of evidence-based treatments to those who would otherwise not receive treatment. This pilot study assessed the feasibility, acceptability, and initial efficacy of an acceptance-based behavioral intervention using Skype videoconferencing to treat adults with generalized SAD. Twenty-four participants received 12 sessions of weekly therapy and were assessed at pre-treatment, mid-treatment, post-treatment, and 3-month follow-up. Participants and therapists rated the intervention as acceptable and feasible. Analyses revealed significant pre-treatment to follow-up improvements in social anxiety, depression, disability, quality of life, and experiential avoidance, with effect sizes comparable to or larger than previously published results of studies delivering in-person CBT for SAD. Implications and future directions are discussed.

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1. Introduction

Numerous barriers exist to providing competent psychological treatment to individuals who suffer from mental health difficulties. Many persons in need are unable to meet regularly with a therapist due to logistical barriers, such as lack of finances, transportation, or time (Olfson et al., 2000). Due to the limited geographic availability of therapists specializing in evidence-based treatment of specific disorders, some patients may have to travel long distances in order to receive proper care, which may not be feasible (Nelson & Velasquez, 2011). Others are unwilling to seek treatment due to concerns about stigmatization or anxiety related to travel or in-person interactions (Olfson et al., 2000).

Remote treatments, which allow individuals to connect with treatment providers from the comfort of their own homes, is a modality that has great potential to bridge the gap between quality psychological treatments and those in need. Internet-mediated interventions, in particular, are promising due to the increasing number of households with access to high-speed Internet connection (Horrigan, 2009). Furthermore, individuals who are unable to afford basic Internet and/or telephone services may have the option of going to a family member or friend's home to use the technology, or to a public library, some of which have private conference rooms with Internet-connected computers that can be reserved.

Self-help websites appear to be effective in treating a variety of disorders (Andersson, 2009), including panic disorder with agoraphobia (Carlbring et al., 2006), social anxiety disorder (Berger, Hohl, & Caspar, 2009), post-traumatic stress disorder (Litz, Engel, Bryant, & Papa, 2007), and depression (Andersson et al., 2005). Patients can access self-help websites from a location and time of their choosing, reducing many of the logistical barriers that prevent people from entering treatment. However, this modality has limited one-on-one real-time contact with a therapist, which may adversely affect patient motivation and adherence to treatment.

Videoconferencing therapy, on the other hand, allows real-time video and audio communication, even though patient and therapist are physically distant. Videoconferencing can take place through Local Area Network connections and dedicated videoconference

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clinics, a model commonly used by Veteran Affairs Medical Centers (Tuerk, Yoder, Ruggiero, Gros, & Acierno, 2010), or simply through the Internet with a personal computer, or even a smartphone. Videoconferencing therapy reduces many of the logistical barriers (e.g., distance, time) associated with obtaining traditional in-person therapy, as patients do not have to travel to and from a provider's office; this can promote more regular sessions amongst those living far away. In addition, patients who refuse to seek in-person treatment due to anxiety about travel, crowds, or social interaction may be more willing to engage in remote treatment.

The growing research literature examining videoconferencing therapy provides preliminary support for remote interventions through videoconferencing as a viable alternative to in-person treatment (for a review, see Simpson, 2009). Videoconferencing appears to be as effective as face-to-face treatment for childhood depression (Nelson, Barnard, & Cain, 2006), older adults with memory problems (Poon, Hui, Dai, Kwok, & Woo, 2005), and a variety of problems at a community counseling center (Day & Schnider, 2002). Videoconferencing has been used to effectively treat panic disorder with agoraphobia (Bouchard et al., 2004), OCD (Goetter et al., 2013; Himle et al., 2006), PTSD (Frueh et al., 2007; Germain, Marchand, Bouchard, Guay, & Drouin, 2010; Tuerk et al., 2010), anxiety in cancer patients (Shepherd et al., 2006), and depressed adolescents and children (Pesamaa et al., 2004). The research evidence to date does not find traditional face-to-face treatment superior to comparable remotely delivered treatment (Harris & Younggren, 2011; Morland et al., 2010). Patients generally report being satisfied with videoconferencing treatment (Simpson, 2009), with therapeutic alliances comparable to in person treatment (Germain et al., 2010). Some patients may even prefer videoconferencing to in-person treatment and be more willing to reveal personal information in remote treatments (Himle et al., 2006; Simpson, Doze, Urness, Hailey, & Jacobs, 2001).

To our knowledge, no published studies exist on videoconferencing therapy specifically for the treatment of social anxiety disorder (SAD). SAD is a debilitating anxiety disorder associated with high personal and economic costs, including decreased quality of life, work productivity, quality of social relationships, and financial independence (Lipsitz & Schneier, 2000). Lifetime prevalence rates for SAD range from 5 to 12% (Grant et al., 2005; Kessler, Berglund, Demler, Jin, & Walters, 2005). Over 80% of people with SAD do not receive any treatment (Grant et al., 2005). Many individuals with SAD avoid discussing their social fears and difficulties with others, including health care workers, due to embarrassment or shame (Olfson et al., 2000). Thus, due to the nature of social anxiety, a significant number of adults with SAD are unwilling or reluctant to seek psychological treatment (Grant et al., 2005).

Research supports various CBT protocols for treating SAD of which exposure is a key component (Dalrymple & Herbert, 2007; Heimberg & Becker, 2002; Rodebaugh, Holaway, & Heimberg, 2004). Exposure via in-session role-play exercises with confederates (e.g., initiating and maintaining conversations, delivering speeches, acting assertively) is often used in treatment programs for SAD. This raises the question of how well therapist-guided exposure exercises can be accomplished via videoconferencing. Furthermore, videoconferencing allows for real-time communication between the therapist and patient, as well as for the exchange of visual information. This real-time visual component can potentially enhance communication and allow the therapist to observe and provide feedback on the patient's social skills, which is an important component of social skills training in the treatment of SAD (Herbert et al., 2005).

Given how consumers have embraced technology-driven communication, it is important for the mental health field to understand how these technologies, such as videoconferencing, can be utilized to provide effective services (Maheu, Pulier, McMenamin, & Posen, 2012). Clinical research is greatly needed in order to increase the field's understanding of the advantages and disadvantages of using telehealth in lieu of face-to-face therapy (Harwood et al., 2011). To explore these questions, we examined the feasibility and efficacy of delivering exposure therapy for SAD through videoconferencing. We hypothesized that patients and therapists would report the videoconferencing modality as acceptable and feasible. We also hypothesized that levels of social anxiety, depression, disability, quality of life, and experiential avoidance would improve from pre-treatment to post-treatment.

2. Method

2.1. Participants

Participants were 24 adults (75% male) with a mean age of 35.0 ($SD = 10.8$) and ranging from 19 to 63 years old (see Table 1 for demographics). Participants were recruited through community media and professional referrals through a university-based anxiety clinic. Eight percent of participants lived in a rural area, as defined by the Census 2000 Urban and Rural Classification (U.S. Census Bureau Geography Division, 2000). Potential participants were administered the SCID-IV for Axis I disorders and social phobia section of the ADIS to determine Generalized SAD as the primary Axis I disorder, a requirement for eligibility. Fifty four percent of participants had no other current Axis I disorder in addition to SAD. Comorbid disorders to SAD were as follows: 13% had current major depressive disorder, 13% had generalized anxiety disorder, 8% had depression NOS, 8% had a specific phobia, 4% had alcohol abuse, 4% had agoraphobia without panic disorder, and 4% had panic disorder without agoraphobia. Participants agreed to refrain from any other therapy during the treatment phase of this study, and participants on psychotropic medication (21%) were maintained at a stable dosage. Participants were also required to have access to a computer that could run the Skype videoconferencing application, a web camera, and broadband connection to the Internet (DSL, cable, wireless). Exclusion criteria included: psychotic symptoms, acute suicide potential, history of substance dependence within the past 6 months, mental retardation, and a pervasive developmental

Table 1
Demographic data.

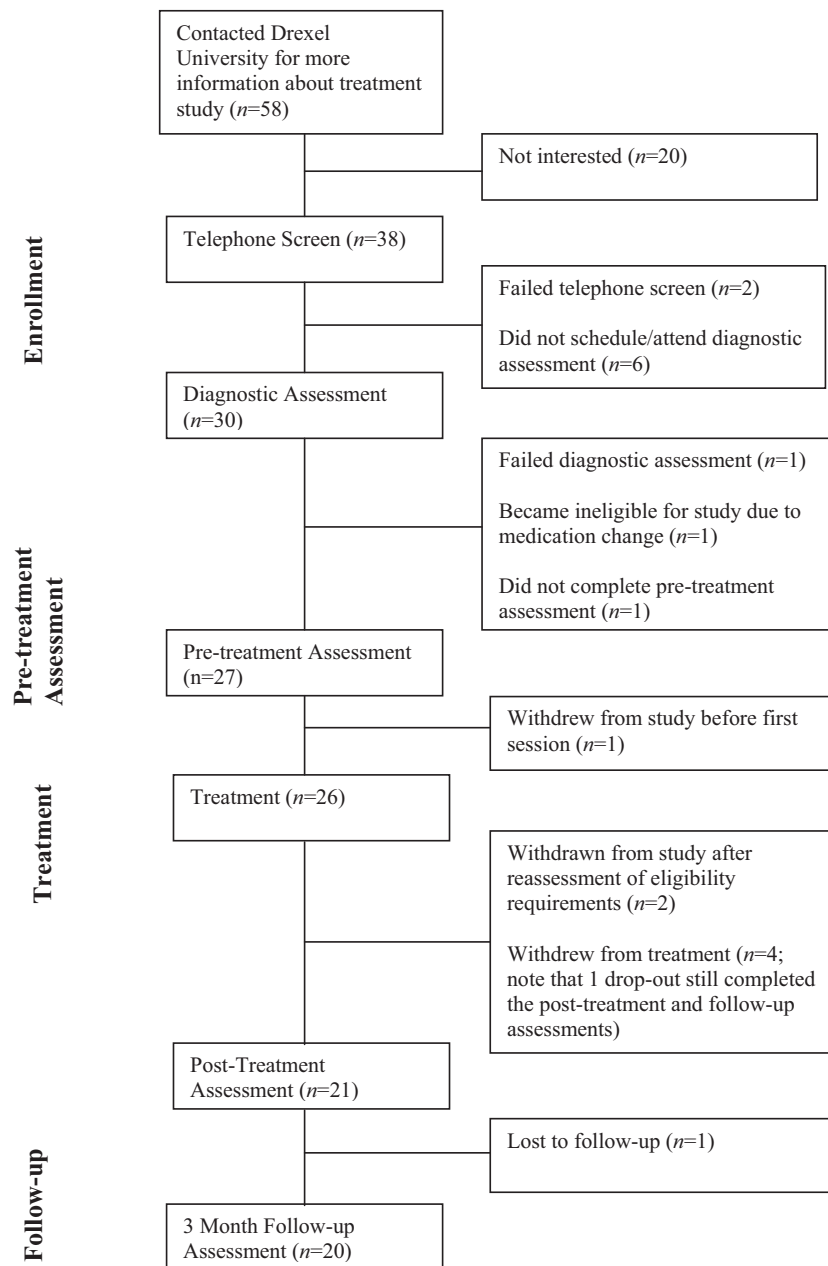|	Percentage ($n = 24$)
Gender	
Male	75% (18)
Female	25% (6)
Ethnicity	
Caucasian	75% (18)
Asian	8% (2)
African American	4% (1)
Hispanic	4% (1)
Education	
Some high school	4% (1)
GED	4% (1)
High school diploma	4% (1)
Some college	25% (6)
College degree	42% (10)
Graduate degree	21% (5)
Employment	
Unemployed	38% (9)
Part-time	12% (3)
Full-time	46% (11)
Student	4% (1)
Marital status	
Single	46% (11)
Married	46% (11)
Other	8% (2)

Fig. 1. Participant flow.

disorder. Ineligible individuals were provided with treatment referrals elsewhere (see Fig. 1 for participant flow).

The majority of participants reported that they were "very comfortable" with computers (63%), while 13% were "comfortable," 8% were "slightly comfortable," 4% were "slightly uncomfortable," and 13% were "very uncomfortable." All participants had high-speed Internet access, with 46% using cable, 29% using wireless, and 25% using DSL (digital subscriber line). Of the participants, 42% had prior experience with the videoconferencing feature of Skype, 12% had experience with just the audio/telephone feature of Skype, and 46% had no prior experience.

Ninety-six percent of participants had received prior mental health services for anxiety or depression, but only 33% reported ever receiving a form of cognitive behavior therapy, and only 38% reported receiving prior treatment specifically for SAD. Of all participants, only 8% actually engaged in in-session exposure exercises during prior treatment, and only 8% engaged in exposure exercises for homework. Forty-six percent reported that prior treatment

included challenging/changing beliefs, 13% reported engaging in cognitive restructuring, and 25% were assigned homework exercises. Of those who had received prior therapy, 50% reported they had received minimal to no benefit. Forty-one percent reported moderate benefit, and 9% reported highly beneficial treatment. Notably, 71% reported that they had previously wished to seek treatment for SAD, but did not follow through, with the most common reasons being financial limitations (46%), lack of time (33%), belief that he/she could handle the problems on own (33%), and geographical limitations, i.e., no suitable mental health professionals nearby (29%).

2.2. Measures

2.2.1. Assessment interviews

The *Structured Clinical Interview for DSM-IV Axis I Disorders* (SCID; First, Spitzer, Gibbon, & Williams, 1996) is a well-known and recognized clinician-administered diagnostic interview for Axis I

disorders based on DSM-IV criteria. It has demonstrated excellent between-rater consistency (Ventura, Liberman, Green, Shaner, & Mintz, 1998). The *Anxiety Disorders Interview Schedule-Revised* (ADIS-R; DiNardo & Barlow, 1988) is the gold-standard diagnostic interview for anxiety disorders. The current study used only the social phobia section of this interview. Assessors completed the *Clinical Global Impression Scale* (CGI; National Institutes of Mental Health, 1985), an established clinical rating system for symptom severity and improvement, after each assessment interview.

2.2.2. Primary self-report measures

The *Social Phobia and Anxiety Inventory* (SPAI; Turner, Beidel, Dancu, & Stanley, 1989) has good psychometric properties (Beidel, Borden, Turner, & Jacob, 1989; Herbert, Bellack, & Hope, 1991; Turner et al., 1989). The 32-item social phobia subscale (SPAI-SP) was used for this study, with good reliability (Cronbach's alpha = .96 for this sample). The *Liebowitz Social Anxiety Scale* (LSAS; Liebowitz, 1987) is an adequately sensitive measure for SAD (Heimberg et al., 1999), and assesses both fear and avoidance of social and performance situations. The self-report version of the LSAS has demonstrated good validity and reliability (Baker, Heinrichs, Kim, & Hofmann, 2002), with a Cronbach's alpha of .91 (LSAS-Fear) and .93 (LSAS-Avoidance) for this sample. The *Brief Version of the Fear of Negative Evaluation Scale* (Brief FNE; Leary, 1983) measures fear of negative evaluation, and has excellent inter-item reliability (Cronbach's alpha = .94 for this sample), good concurrent and discriminant validity, and adequate construct validity (Collins, Westra, Dozois, & Stewart, 2005).

2.2.3. Secondary self-report measures

The *Beck Depression Inventory-II* (BDI-II; Beck, Steer, & Brown, 1996) assesses depression symptoms, and has demonstrated good reliability (Cronbach's alpha = .94 for this sample) and strong content, construct, concurrent, and discriminant validity in both clinical and nonclinical samples (Beck, Steer, & Carbin, 1988; Osman et al., 1997; Steer, Ball, Ranieri, & Beck, 1997). The *Sheehan Disability Scale* (SDS; Leon, Olfson, Portera, Farber, & Sheehan, 1997) assesses functional impairment in work, social, and family life. The SDS has satisfactory reliability (Cronbach's alpha = .85 for this sample) and construct and criterion-related validity (A. Leon, Shear, Portera, & Klerman, 1992). The *Quality of Life Inventory* (QOLI; Frisch, Cornell, Villanueva, & Retzlaff, 1992) assesses overall satisfaction in different areas of life. The QOLI has good test–retest reliability and internal consistency (Cronbach's alpha = .85 for this sample). The *Acceptance and Action Questionnaire-II* (AAQ-II; Bond et al., 2011) measures experiential avoidance and psychological flexibility. Preliminary results demonstrate reasonable convergent and discriminant validity (Bond et al., 2011), and Cronach's alpha was .95 for this sample.

2.2.4. Acceptance and feasibility measures

The *Patient Satisfaction Survey* (PSS; Dalrymple & Herbert, 2007) is a patient self-report measure that evaluates satisfaction and treatment acceptability. The *Reaction to Treatment Questionnaire* (RTQ; Borkovec & Nau, 1972; Holt & Heimberg, 1990) is a patient self-report measure assessing treatment expectancies and perceived credibility of the treatment rationale. The *Working Alliance Inventory-Short Form* (WAI-S; Horvath & Greenberg, 1989; Tracey & Kokotovic, 1989) is a patient self-report measure of working alliance between therapist and patient, with sufficient internal reliability (Busseri & Tyler, 2003) on three domains: agreement on treatment goals, agreement on therapeutic tasks, and perception of therapeutic bond. The *Post-Treatment Therapist Survey* asks therapists to rate the difficulty/feasibility levels of videoconferencing treatment for each patient.

2.2.5. Behavioral Assessment Test (BAT)

The BAT consisted of two (dyadic and triadic) 3-min conversations and a 3-min speech. Participants reported their anxiety on the Subjective Units of Discomfort Scale (SUDS), which ranges from 0 to 100, at three time points for each conversation: before, after, and at their highest moment of discomfort. Patients then completed the *Social Interaction Self-Statement Test* (SISST; Glass, Merluzzi, Biever, & Larsen, 1982), a self-report measure containing a subscale of frequency of positive thoughts and a subscale of frequency of negative thoughts. In addition, to ensure validity, the BAT was digitally recorded for subsequent rating by two independent evaluators (one of whom was blind to assessment time point). The assessors provided SUDS ratings of perceived anxiety, and rated participants' social skills using a 5-point Likert scale (1 = poor; 5 = excellent) on four dimensions: verbal content, nonverbal skills, paralinguistic skills, and overall social skills. Both assessors rated all participants, and their ratings were averaged in the data analysis. High inter-rater reliability using intraclass correlation was found: .91 for verbal skills, .88 for nonverbal skills, .91 for paralinguistic skills, .90 for overall social skills, and .91 for appearance of anxiety.

2.3. Procedures

Interested individuals underwent a brief telephone screen and faxed a signed copy of the consent form back to the research office. Structured clinical interviews were conducted via telephone or Skype to determine study eligibility. Potential participants were given written step-by-step instructions for downloading, installing, and using Skype, and were assisted with this process over the telephone. Research staff then arranged a test videoconferencing call with participants to ensure that they had the skills and technical resources to use Skype.

Participants then officially enrolled in the research program and completed a baseline battery of self-report questionnaires, underwent a 1-month waiting period, and then completed the same self-report questionnaires at pre-treatment to control against spontaneous remission or other threats to internal validity. Assessments (which included a structured clinical interview and online questionnaires) were also completed at mid-treatment, post-treatment, and 3-month follow-up. Patients participated in the BAT at pre-treatment and post-treatment. Assessors were clinical psychology doctoral students supervised by licensed psychologists who concurred with all diagnoses.

Treatment consistent of 12 weekly 1-h long therapy sessions. After each session, therapists recorded any technical difficulties that occurred. The therapists were five doctoral students and one masters student in clinical psychology, all of whom were trained in the treatment of SAD and were closely supervised by licensed supervisors, who are recognized experts in the treatment of anxiety disorders. Therapists followed a manualized treatment protocol, Acceptance Based Behavior Therapy for Social Anxiety Disorder (ABBT for SAD; Herbert, Forman, & Dalrymple, 2009). Similar to other CBT protocols for SAD, ABBT for SAD focuses on exposure exercises that are practiced during in-session role play exercises as well as completed for homework. Patients were taught to view anxiety as less threatening, to engage in behaviors consistent with personally derived values, and to weaken the influence of thoughts on behavior.

The first two sessions consisted of psychoeducation about SAD and socialization to the treatment model. Beginning in session 3, in-session exposure exercises were conducted in which patients were exposed to carefully constructed scenarios of their particular fears (e.g., individual or group conversations, speeches, assertive behaviors). Research staff served as confederate role-players for these in-session exposures, joining the therapist in the same office, and the camera was adjusted to allow the patient to see the role-players.

During in-session exposure exercises, therapists provided guidance and feedback on the patients' social skills, such as conversation techniques (e.g., entering a group conversation, finding commonalities, asking questions) and body language (e.g., eye contact, smiling, open posture). Each session concluded with a homework assignment consisting of practicing the strategies addressed in that session, and engaging in real-life exposure assignments. Additional homework assignments required patients to read handouts, complete forms (e.g., monitoring form, values chart), and email them to the therapist. Throughout treatment, patients were taught to recognize that they could display good social skills and have successful social interactions despite the presence of anxiety. Treatment also emphasized engaging in behaviors consistent with their values (e.g., engaging in social situations) despite of their anxiety.

3. Results

Both intent-to-treat (ITT) and completer-only analyses were conducted and the pattern of results was equivalent; therefore only the former are reported. Multiple imputation (Rubin, 1987) using SPSS was conducted to account for missing data. No significant differences were found between baseline and pre-treatment (i.e., post 1-month waiting period) scores, which is consistent with previous literature that SAD has an unremitting course (Grant et al., 2005). Because this was a pilot study examining preliminary feasibility, acceptability and effectiveness of a novel treatment delivery system, we were mindful of balancing concerns over Type I error with those regarding Type II error. Therefore, we elected not to adjust alpha to control for experiment-wise Type I error.

Twenty-six participants began treatment. One participant was removed from the study after reassessment revealed that SAD was not his primary disorder. A second participant was removed due to not having high-speed Internet access. Excluding these participants, attrition rate was 17%, with 20 out of 24 participants completing treatment. Reasons for attrition were as follows: 1 participant reported being busy with other obligations, 1 participant reported having to focus on a family crisis, and 2 participants reported that they were not interested in continuing treatment but without specifying any specific reason.

3.1. Acceptability and feasibility

Based on the patient satisfaction survey, patients were satisfied with their treatment (95% completely or mostly satisfied) and therapists (100% completely or mostly satisfied). Patients reported decreased fear (91% strongly agreed or agreed) and decreased avoidance of social situations (91% strongly agreed or agreed). Patients expected their fears and avoidance to be less severe at 1 year from post-treatment (only 10% predicted fairly or very severe symptoms) and at 5 years from post-treatment (only 5% predicted fairly or very severe symptoms). All reported that they would recommend this treatment to a friend. Of note, nearly all patients (95%) reported that receiving treatment through Skype was fairly or very easy.

On the patient satisfaction survey, patients commented on the convenience of videoconferencing treatment (e.g., "I am a full time mother, so getting to stay in the comfort of my own home was extremely beneficial"; "It was convenient as I was able to meet with my therapist whether I was at home or on the road"), the ease of communication (e.g., "With the exception of one week where we had connectivity issues, it was fairly easy to communicate through Skype. I feel like it was just as effective as meeting in person would have been"; "Somewhat awkward at first, but it felt more natural before long"), connection quality (e.g., "Very easy to connect, video

and voice quality were usually great"; "Sometimes I had some connection issues"), and the helpfulness and limitations of exposure exercises through videoconferencing ("Only issue was I feel less anxious over the computer than doing exposures in real life. But exposures were still very helpful and still made me anxious"; "It's easier to feel more detached through Skype. But it's great for people who are long distance and cannot go to the office").

Therapists rated the feasibility of delivering treatment through Skype as "very feasible" for 29% of cases, "fairly feasible" for 54% of cases, and "neutral" for the remaining 17% of cases. Therapists rated the difficulty level as "very easy" for 8% of cases, "fairly easy" for 63% of cases, "neutral" for 21% of cases, and "fairly difficult" for 8% of cases. Therapists reported moderate to severe technical problems for 13% of sessions, and minor technical problems for 26% of sessions.

Disruptions in sound quality (e.g., choppiness, softness, echoing, or delay) was the most commonly reported technical problem (30% of sessions), followed by disruptions in video quality (choppiness, blurriness, frozen picture, or delay; 27% of sessions). Occasionally (6% of sessions), the videoconferencing call froze or was ended abruptly forcing the therapist and patient to restart the call. Inability to transmit or receive sound or video occurred in 8% of sessions, but was remedied after troubleshooting in most cases. Patients using wireless Internet connections experienced more technical problems than those using cable or DSL connections. Severity of technical difficulties was greater earlier in treatment (first 10% of sessions) compared to the later sessions (trend; $\chi^2 = 3.39$, $df = 1$, $n = 263$, $p = .06$). No relationship was detected between technical difficulties and (residualized) change in social anxiety symptoms: SPAI ($r = -.04$, $p = .85$), LSAS-Total ($r = .12$, $p = .58$), Brief-FNE ($r = .18$, $p = .39$).

3.2. Treatment outcome

Repeated-measures analyses of variance (ANOVAs) were conducted for the treatment outcome measures across pre-treatment, mid-treatment, post-treatment, and 3-month follow-up. The ANOVA results were significant with large effect sizes for all measures of social anxiety symptoms: SPAI-SP Wilks' Lambda = .26, $F(3, 21) = 19.59$, $p < .01$; LSAS-Fear Wilks' Lambda = .28, $F(3, 21) = 17.81$, $p < .01$; LSAS-Avoidance Wilks' Lambda = .33, $F(3, 21) = 14.25$, $p < .01$; Brief-FNE Wilks' Lambda = .30, $F(3, 21) = 16.27$, $p < .01$; and CGI-Severity Wilks' Lambda = .15, $F(3, 21) = 39.60$, $p < .01$. Tukey's post hoc tests revealed decreases in social anxiety from pre-treatment to follow-up for all social anxiety measures. ANOVAs with Tukey's post hoc tests also revealed significant pre-treatment to 3-month follow-up improvement on the BDI, Wilks' Lambda = .51, $F(3, 21) = 6.77$, $p < .01$, SDS-Total, Wilks' Lambda = .32, $F(3, 21) = 14.76$, $p < .01$, QOLI, Wilks' Lambda = .70, $F(3, 21) = 3.02$, $p = .05$, and AAQ-II, Wilks' Lambda = .49, $F(3, 21) = 7.26$, $p < .01$ (Table 2).

The majority of participants ($n = 13$; 54%) no longer met DSM-IV-TR criteria for SAD at post-treatment. On the CGI-Improvement measure, 33% of participants were given a rating of 1 (very much improved), 38% a rating of 2 (much improved), 17% a rating of 3 (minimally improved), and 12% were not given a score because they dropped out. Intent-to-treat treatment response rate, defined as having a CGI-Improvement score of 1 or 2 (very much or much improved), was 71% at post-treatment. Higher baseline RTQ scores were slightly correlated with greater reductions in social anxiety (Brief-FNE: $r = -.43$, $p = .04$; LSAS-Total: $r = -.33$, $p = .13$; SPAI_SP: $r = -.24$, $p = .26$). Scores on the WAI (given after session 2) were not correlated with pre-treatment to follow-up residual gain scores in social anxiety symptoms: SPAI ($r = -.07$, $p = .75$), LSAS-Total ($r = .03$, $p = .91$), Brief-FNE ($r = -.10$, $p = .66$).

Table 2
Means, standard deviations, and effect sizes for intent-to-treat sample.

Measure	M	SD	Effect size (Cohen's d)
SPAI-SP			
Pre-treatment	138.57	25.96	
Mid-treatment	113.09	24.57	
Post-treatment	89.07	29.60	1.91
Follow-up	84.06	28.97	2.10
LSAS-Total			
Pre-treatment	80.42	23.32	
Mid-treatment	65.25	22.40	
Post-treatment	47.71	21.66	1.40
Follow-up	50.13	18.81	1.30
LSAS-Fear			
Pre-treatment	42.17	10.68	
Mid-treatment	36.38	10.20	
Post-treatment	27.92	11.42	1.33
Follow-up	27.79	10.04	1.35
LSAS-Avoidance			
Pre-treatment	38.25	13.31	
Mid-treatment	28.88	13.41	
Post-treatment	19.79	11.40	1.39
Follow-up	22.33	10.40	1.20
Brief-FNE			
Pre-treatment	50.21	8.99	
Mid-treatment	46.08	7.00	
Post-treatment	39.13	7.73	1.23
Follow-up	37.50	6.45	1.41
BDI			
Pre-treatment	15.92	11.33	
Mid-treatment	9.29	8.48	
Post-treatment	6.13	6.50	0.86
Follow-up	5.63	6.65	0.91
CGI-Severity			
Pre-treatment	4.54	0.72	
Mid-treatment	4.17	0.96	
Post-treatment	2.83	1.01	2.38
Follow-up	2.67	1.05	2.60
QOLI			
Pre-treatment	−0.09	1.97	
Mid-treatment	0.22	1.69	
Post-treatment	0.96	1.70	0.53
Follow-up	0.99	1.85	0.55
SDS-Total			
Pre-treatment	21.71	5.33	
Mid-treatment	13.92	6.95	
Post-treatment	9.38	7.00	2.31
Follow-up	9.21	7.10	2.35
AAQ-II			
Pre-treatment	29.50	10.83	
Mid-treatment	24.75	7.96	
Post-treatment	23.42	7.73	0.56
Follow-up	20.13	5.42	0.87
SISST-Positive			
Pre-treatment	31.88	7.27	
Post-treatment	40.97	10.37	1.25
SISST-Negative			
Pre-treatment	54.58	10.76	
Post-treatment	31.62	10.20	2.13
Self-reported pre SUDS			
Pre-treatment	47.86	19.14	
Post-treatment	35.24	15.13	0.66
Self-reported post SUDS			
Pre-treatment	57.35	17.29	
Post-treatment	38.16	15.52	1.11
Self-reported peak SUDS			
Pre-treatment	64.44	17.71	
Post-treatment	46.80	17.22	1.00

Table 2 (*Continued*)

Measure	M	SD	Effect size (Cohen's d)
Clinician-rated verbal skills			
Pre-treatment	3.35	1.06	
Post-treatment	4.43	0.72	1.02
Clinician-rated nonverbal skills			
Pre-treatment	3.34	0.93	
Post-treatment	4.14	0.73	0.86
Clinician-rated paralinguistic skills			
Pre-treatment	3.28	0.96	
Post-treatment	3.87	0.78	0.61
Clinician-rated overall social skills			
Pre-treatment	3.39	1.14	
Post-treatment	4.33	0.82	0.82
Clinician-rated appearance of anxiety			
Pre-treatment	5.28	2.27	
Post-treatment	3.04	1.60	0.99
Self-reported performance rating			
Pre-treatment	2.40	0.78	
Post-treatment	3.40	0.54	1.28
WAI-Total			
Session 2	5.22	0.42	
Mid-treatment	5.50	0.63	
Post-treatment	5.73	0.67	1.21
Follow-up	5.60	0.65	0.90

3.3. Behavioral Assessment Test

T-tests and Wilcoxon Signed Rank tests found that performance ratings were higher and anxiety ratings were lower at post-treatment compared to pre-treatment. Significant pre- to post-treatment improvements were found on all clinician-rated BAT measures of the patients' social skills: paralinguistic social skills, $t(22) = −4.88$, $p < .01$; verbal social skills ($Z = −3.70$, $p < .01$); nonverbal social skills ($Z = −3.53$, $p < .01$); overall social skills ($Z = −3.11$, $p < .01$); and appearance of anxiety, $t(22) = 5.60$, $p < .01$, Likewise, significant improvements were seen for all patient self-report BAT measures: perception of social skills, $t(23) = −4.89$, $p < .01$; SISST-Positive, $t(23) = −3.52$, $p < .01$; SISST-Negative, $t(23) = 10.05$, $p < .01$; pre-SUDS, $t(23) = 4.22$, $p < .01$; post-SUDS, $t(23) = 6.52$, $p < .01$; and peak-SUDS, $t(23) = 6.71$, $p < .01$.

4. Discussion

This study is among the first to test the remote delivery of state-of-the-art treatment for SAD through a user-friendly and free videoconferencing application installed on the patients' personal computer. Results demonstrate that this treatment modality is acceptable and feasible from both the patient and therapists' perspectives. The vast majority of patients believed that receiving treatment through videoconferencing was easy and embraced this modality. Participants had the convenience of receiving remote treatment in a location of their choosing, which included their homes, work office, parked car outside their work office, hotel room, and public library with a private conference room. Technical problems were common, however most had minimal impact on the quality of the therapy sessions and were quickly corrected. Furthermore, technical difficulties were not associated with treatment outcome, and as therapists and patients gained more experience with Skype, the frequency of technical difficulties decreased. The dropout rate of 17% is comparable to previously reported dropout rates for in-person CBT for SAD (Dalrymple & Herbert, 2007; Davidson et al., 2004; Fedoroff & Taylor, 2001; Otto et al., 2000).

Treatment delivered through Skype was successful, as evidenced by the significant reductions in psychopathology and improvements in functioning at post-treatment and 3-month

follow-up. Treatment response rate at post-treatment is comparable to previously reported treatment response rates for in-person CBT for SAD (Davidson et al., 2004; Heimberg et al., 1998). Effect sizes for social anxiety measures ($d = 1.23$–1.91) were *larger* than the effect sizes reported for a pilot study of ABBT for SAD delivered in person ($d = 0.72$–1.24), which used the same treatment manual as the current study (Dalrymple & Herbert, 2007). Effect sizes for the current study were also larger than previously reported pre- to post-treatment effect sizes for widely cited RCTs of in-person treatment for SAD ($d = 0.78$–1.36), as well as relative to those reported in a meta-analysis of exposure plus CT ($d = 0.84$) and exposure-only interventions ($d = 1.08$; Fedoroff & Taylor, 2001). It is possible that the alleviation of logistic difficulties for the patients (e.g., transportation costs and time), or the novelty effect, may have influenced the large effect sizes. Greater positive expectations of treatment after session 2 was slightly associated with greater reductions in social anxiety, underscoring the importance of fostering positive expectations for treatment outcome and gaining "buy in" when explaining the treatment rationale. Stronger working alliance between therapist and patient was not associated with greater reductions in social anxiety.

A major advantage of this videoconferencing therapy is that it allowed for the exchange of visual non-verbal communication between patient and therapist, unlike telephone or website-based treatment. Videoconferencing facilitates communication, provides opportunities for the therapist to assess the patients' nonverbal social skills (e.g., eye contact, posture, facial expressions), and provides opportunities for patients to practice these skills. Furthermore, viewing both friendly and unfriendly nonverbal communication during in-session exposure exercises provides additional anxiety-provoking social stimuli for the patients.

A disadvantage to this videoconferencing treatment is that in-session exposure exercises were limited to scenarios that could be completed through videoconferencing. For example, the therapist and patient were not able to do in-session exposures on the street or at a specific location related to the patient's fears. However, this limitation was tempered by the variety of in-session exposure exercises that therapists employed and the assignment of a wide range of exposure exercises in outside locations for homework. In addition, confederate role-players may not be available to assist with in-session exposures in many front-line clinical settings. In such cases, the therapists themselves can serve as role-players to practice feared social scenarios with the patient. In some settings, non-clinical staff (e.g., secretarial staff) can be used as role players. Therapists can also have the patient practice speaking on the telephone as their in-session exposure (e.g., calling up a store to ask for information, or calling a friend to invite them to lunch).

In general, most patients reported feeling anxious during in-session exposure exercises, which is widely believed to be necessary for effective exposure. However, some patients reported that interacting with role-players remotely through videoconferencing, as opposed to in person, made the role-plays feel less realistic, and thus they were somewhat less engaged. Another disadvantage was how, in most cases, only the patients' face and upper torso were visible through the camera, preventing the therapist from viewing body language from other parts of the body, such as fidgeting and posture. Depending on the video quality, the therapist may not have been able to view subtle facial expressions. Also, because the patients were looking directly at the therapists' and role-players' faces on the computer screen, as opposed to at the web camera, it was often difficult for therapists to ascertain level of eye contact.

Based on the therapists' and participants' experiences using videoconferencing in this study, we have several recommendations for future therapy programs utilizing videoconferencing. Providing thorough technical and troubleshooting training upfront to therapists and patients before the start of treatment can reduce the number and severity of technical difficulties that occur during session, as well as reduce the time required to address the problems. Treatment can also be enhanced by establishing a high-quality Internet connection by using adequate hardware (e.g., echo-cancellation webcams) to improve visual and audio quality; placing the therapist's webcam close to the visual image of the patient's face on the computer screen (so that it appears to the patient that the therapist is making eye contact); and conducting in-session role-plays with a variety of well-trained confederates (if available) who are able to speak and act in a manner congruent with real-life social situations that trigger social anxiety. Importantly, patients should be informed of the privacy risks associated with online communication, as well as the user policies of the videoconferencing service with regards to the collection of personal information. Although Skype employs peer-to-peer communications and encryption technology, the security of these messages cannot be guaranteed. In addition, Skype collects and analyzes user information (e.g., profile details, IP address) for customer service and quality improvement purposes, which may potentially be shared with Skype's group companies, carriers, and partner service providers.

In addition, videoconferencing software can be used with a laptop, tablet, or smartphone through free Wi-Fi access points. Therapists could have patients venture outside of their homes to public locations and initiate social interactions with real-life people with the therapist observing. For example, patients with a smartphone can engage in in vivo exposures (e.g., in a store) while connected via videoconferencing to their therapist who provides real-time encouragement and feedback. This is analogous to in-person therapy sessions during which a patient and therapist may step outside the therapy room and engage in social activities such as initiating conversation with a confederate or a stranger. This method is a particularly helpful option in clinical settings where confederate role-players are not available.

Of note, the majority of participants in this study were male (75%) whereas the distribution of gender is generally more evenly split for in-person treatment studies of SAD (Dalrymple & Herbert, 2007; Davidson et al., 2004; Heimberg et al., 1998; Herbert et al., 2005; Herbert, Rheingold, Gaudiano, & Myers, 2004; Otto et al., 2000). Perhaps there is something specifically about the videoconferencing modality that leads to a greater proportion of men compared to women seeking the treatment. For example, men may be more willing to utilize video technology and/or for their faces be seen on the computer screen by the therapist.

Over the past decade, increasing support in the literature has been generated for the efficacy, acceptability, and feasibility of remote interventions. Telemental health interventions that utilize innovative technology, such as videoconferencing software, have the potential to reach a much higher percentage of the U.S. population than can be served in the traditional face-to-face format. Although financial limitations and lack of access to technology (e.g., Internet) may still keep individuals from treatment, rural and low-income Americans have the largest recent growth in broadband connectivity (Horrigan, 2009). The opportunities to develop and offer patients remote treatments will continue to expand as new technologies emerge and become available to the public (e.g., mobile applications) (Yuen, Goetter, Herbert, & Forman, 2012).

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