

# Delivering Cognitive-Behavior Therapy for Panic Disorder with Agoraphobia in Videoconference

STÉPHANE BOUCHARD, Ph.D.,<sup>1,2</sup> BELLE PAQUIN, M.A.,<sup>2</sup>  
RICHARD PAYEUR, M.D., F.R.C.P.,<sup>2</sup> MICHELINE ALLARD, M.A.,<sup>2,3</sup>  
VICKY RIVARD, M.A.,<sup>3</sup> THOMAS FOURNIER, Ph.D.,<sup>1</sup>  
PATRICE RENAUD, Ph.D.,<sup>1</sup> and JUDITH LAPIERRE, Ph.D.<sup>1</sup>

## ABSTRACT

Delivering psychotherapy by videoconference could significantly increase the accessibility of empirically validated treatments. The aim of this study was to compare the effectiveness of cognitive-behavior therapy (CBT) for panic disorder with agoraphobia (PDA) when the therapy is delivered either face-to-face or by videoconference. A sample of 21 participants was treated either face-to-face or by videoconference. Results showed that CBT delivered by videoconference was as effective as CBT delivered face-to-face. There was a statistically significant reduction in all measures, and the number of panic-free participants among those receiving CBT by videoconference was 81% at post-treatment and 91% at the 6-month follow-up. None of the comparisons with face-to-face psychotherapy suggested that CBT delivered by videoconference was less effective. These results were confirmed by analyses of effect size. The participants reported the development of an excellent therapeutic alliance in videoconference as early as the first therapy session. The importance of these results for treatment accessibility is discussed. Hypotheses are proposed to explain the rapid creation of strong therapeutic alliances in videoconferencing.

## INTRODUCTION

**E**PIDEMIOLOGICAL DATA suggest that a large proportion of people with anxiety disorders may not mention their symptoms to medical professionals, seek psychological treatment, receive adequate diagnoses, or receive empirically validated psychological treatment.<sup>1-5</sup> Limited access to mental health professionals impedes proper treatment for many people with anxiety disorders. Access is especially difficult in rural areas where there are few psychologists trained in the application of empirically validated

treatments. Geographical isolation may also impede access to psychological services for people in remote military and exploration bases, those working in mining camps, and those traveling for long periods of time such as sailors and military personnel. To gain access, people living in remote or under-served areas may have to travel long distances to receive treatment at specialized clinics. Sometimes, however, travel presents an insurmountable barrier. In some cases, the person requiring treatment may not have enough time or money to travel. In other cases, the anxiety disorder

<sup>1</sup>Department of Psychoeducation and Psychology, Université du Québec en Outaouais, Gatineau, Quebec, Canada.

<sup>2</sup>Anxiety Disorders Clinic, Centre Hospitalier Pierre-Janet, Gatineau, Quebec, Canada.

<sup>3</sup>Department of Psychology, University of Ottawa, Ottawa, Ontario, Canada.

makes travel impracticable; those with flying or driving phobias, agoraphobia, or social phobia may be too frightened to travel, and those with co-morbid depression may not have the energy or will to travel.

Geography does not limit access only in isolated rural communities; geography also imposes constraints in metropolitan communities. Urban clients are typically limited to clinicians in their own city because it is impractical to travel to another city for therapy. For example, a New Yorker who would like to be treated by a provider in Philadelphia would probably have to choose a clinician in New York because it would not be feasible to commute to Philadelphia to receive treatment.

Telepsychotherapy offers a solution to the problem of accessibility. Telepsychotherapy, or the use of information technology to provide remote mental health assessment, diagnosis, intervention, consultation, education, and information, offers a solution to the problem of accessibility.<sup>6</sup> Several systems have been tried by psychologists,<sup>7</sup> and the most promising is the videoconference.

Indeed, a few studies demonstrated the successful application of telepsychotherapy.<sup>8,9</sup> Although promising, none of these studies offered an evidence-based demonstration of the adequacy of telepsychotherapy as an alternative to face-to-face therapy, and only one study dealt with the treatment of anxiety disorders. These studies also have other important shortcomings. Several videoconference studies are based on psychiatric consultations rather than complete psychotherapy,<sup>10,11</sup> and others have been conducted with very few cases.<sup>12,13</sup> Other common limitations include the absence of specific and reliable diagnoses, samples comprising different mental disorders, treatments that have not been empirically validated, treatment delivery that was not standardized with explicit protocols, and the absence of follow-up. The largest study was based on 80 participants suffering from various mental disorders.<sup>14</sup> In this study, the effectiveness of cognitive-behavior therapy (CBT) delivered face-to-face was compared with the effectiveness of the same therapy delivered by videoconference or by telephone. All therapy sessions took place in the same building. Results showed that five

treatment sessions led to statistically significant improvements in all treatment conditions when compared to a waiting list. There were no significant differences among the three active treatment conditions. Another study also reported success with CBT via videoconference, but this preliminary study lacked a control group.<sup>15</sup> Despite their limitations, all these studies clearly demonstrated that psychotherapy can be delivered by videoconference. Several of the studies reported that a therapeutic alliance could be built in videoconference, and an effective alliance does not depend on physical proximity.<sup>12,13,15</sup>

The use of explicit treatment protocols to address specific symptoms of specific diagnoses<sup>16</sup> is considered necessary for treatment effectiveness. Panic disorder with agoraphobia (PDA) is an ideal disorder for testing effectiveness of cognitive behavioral telepsychotherapy because it involves a fear of traveling long distances. Moreover, PDA is highly prevalent,<sup>17</sup> debilitating,<sup>18–20</sup> and amenable to CBT.<sup>21,16</sup>

Two studies have assessed the effectiveness of telephone-based psychotherapy for PDA. McNamee *et al.* compared exposure versus relaxation for 14 housebound PDA patients.<sup>22</sup> Patients and therapists spoke over the phone for a total of 2 hours over 12 weeks. Exposure was more effective than relaxation, even though the psychotherapeutic contact with the patients was rather brief compared to standard CBT treatment. Swinson *et al.* compared eight sessions of behavioral therapy delivered over the phone to a waiting list for 42 patients with PDA, all living in a rural area,<sup>23</sup> and found that telephone-delivered behavior therapy was effective at post-treatment and at the 6-month follow-up.

The results of telephone-based telepsychotherapy studies cannot be generalized to videoconference telepsychotherapy because the two media are different. Videoconference enables the therapist and the client to see nonverbal behavior that cannot be observed by telephone. For example, when conducting interoceptive exposure exercises, videoconference enables the therapist to show the client how to do the exercise, and then to ensure that the patient performs it correctly. Videoconference also enables the therapist to see if the patient engages in avoidance or safety-seeking behaviors. The

therapist does not have to infer behavior based just on what they can hear. It has been reported that therapists feel more capable and comfortable when they interact with clients by videoconference than when they interact by telephone. For instance, Swinson *et al.* reported that therapists may feel less able to treat patients with co-morbid disorders over the phone than face-to-face.<sup>23</sup> Stamm remarked that "getting to see patients, even poorly, makes a difference. It often provides an emotional boost and a sense of being more connected for both parties"<sup>24</sup> (p. 541). It is also important to avoid conflating videoconference and telephone telepsychotherapy because the former is novel and untested, and the latter is already fairly common.<sup>7</sup>

The present study assesses videoconferencing, a powerful new communication medium, as a tool to deliver CBT for PDA. This assessment could be done in a number of different ways, but given the high success-rate of face-to-face CBT for PDA, the issue of statistical power must be addressed. A common way to increase statistical power when a treatment is highly successful is to use control conditions that have low success rates. For example, a comparison between videoconference CBT and a placebo condition would probably be statistically powerful because the placebo response rate is usually about 30%, and face-to-face CBT is above 70% and sometimes as high as 90%.<sup>21,25-27</sup> In addition to being uninteresting, a comparison with a placebo control group is ethically questionable by current Canadian standards of ethics in research. A comparison with a waiting list control group would be uninformative because there is already evidence that suggests that videoconference telepsychotherapy is better than no therapy at all. The ideal solution is to recruit a very large sample, and to compare videoconference telepsychotherapy with a method that is already considered a gold standard: face-to-face CBT. This ideal solution, however, is almost unfeasible; given the difficulty of recruiting participants in sparsely populated rural areas, and given the necessity of stringent diagnostic selection criteria, it is extremely difficult and expensive to recruit enough participants to have even a minimal power of 0.80, much less an ideal level of 0.95. The impact of sampling logistics on power

is compounded by the expectation that the differences between the videoconference and face-to-face groups will be small.<sup>28</sup> The strategy favored in the present study, therefore, is to use effect size to predict the magnitude of the differences between the two treatment approaches, and then to estimate the importance of these differences.<sup>28</sup> The hypothesis is that the differences in effectiveness between the two methods of treatment delivery are very small. This study will also investigate the development of the therapeutic alliance and the therapeutic bond in videoconference.

## MATERIALS AND METHODS

### *Sample*

Half of the sample was recruited in Maniwaki (remote site), a city of 4600 people located 150 kilometers north of Ottawa. Maniwaki was already served by mental health services (a regional hospital, a mental health clinic, local community services, services for a First Nation reserve, etc.). The other half of the sample was recruited in Gatineau (local site), a city adjacent to Ottawa.

All participants were referred by mental health professionals working in mental health clinics. Upon referral, each participant received the Structured Clinical Interview for DSM-IV (SCID)<sup>29</sup> to ascertain the presence of PDA and other mental disorders (kappa of 0.86 for the agreement between two interviewers in the research team). Exclusion criteria were fixed a priori: (1) principal diagnosis other than PDA; (2) self-report of less than four panic attacks in the month preceding the SCID; (3) duration of illness of less than 6 months; (4) diagnosis of bipolar disorder, schizophrenia or psychotic disorder, organic mental disorder, intellectual deficiency, or severe personality disorders; (5) below 18 or above 65 years of age; (6) currently receiving other psychological treatment; (7) presence of a medical condition precluding participation in the treatment for methodological or clinical reasons (e.g., hypoglycemia, cardiovascular disease, Meunier syndrome, asthma, history of seizures, pheochromocytoma, hyper- or hypothyroidism, brain or lung tumors); (8) if taking antidepressants, MAOIs,

or SSRIs, using them for less than 6 months, or if taking benzodiazepines for less than 3 months. Subjects on medication who corresponded to the selection criteria were included only if they agreed not to change their medication or to increase its dosage during the study.

The sample consisted of 21 adults, 10 at the local site (8 females) and 11 at the remote site (7 females). Table 1 contains descriptive information on the sample. Ages ranged from 24 to 63 years; the number of years of education varied from 6 to 20; the duration of the disorder ranged between 1 and 21 years; and the number of co-morbid diagnoses varied from 0 to 4. Approximately half of the referrals had already received treatment for a mental disorder. Only one participant, who was at the remote site, had CBT before.

### Instruments

The variables were assessed after the diagnostic interview (intake), at pretreatment, at posttreatment, and at a 6-month follow-up. The only exception was the therapeutic alliance, which was measured after the first therapy ses-

sion, after the third session, and at posttreatment. Alliance scores were reported only for participants in the telepsychotherapy condition because the participants in the face-to-face condition began treatment a few weeks earlier, before the first and third session alliance measurements were added to the assessment protocol. Posttreatment alliance scores can be biased by treatment success, so it is preferable to measure alliance early in the treatment,<sup>30,31</sup> usually after the first session and after the third or fifth session. In the absence of the first and third session measurements, therefore, the posttreatment face-to-face alliance scores were not reported.

*Daily diaries:* Panic attacks and panic apprehension were recorded in diaries completed during a 4-week self-monitoring period. Before beginning self-monitoring, subjects received detailed information about the importance of the diaries and how to complete them adequately. Subjects were instructed to carry the panic diary with them at all times and to complete it as soon as possible after a panic attack. Participants were taught to identify and monitor panic attacks and to differentiate them from generalized anxiety and episodes of stress. A written de-

TABLE 1. DESCRIPTION OF THE SAMPLE AT THE LOCAL SITE (HULL, FACE-TO-FACE THERAPY) AND AT THE REMOTE SITE (MANIWAKI, TELEPSYCHOTHERAPY)

	Local site (n = 10)	Remote site (n = 11)
Mean age	37.1 (8.15)	38.8 (15.5)
Mean number of years in school	14.3 (3.2)	10.6 <sup>a</sup> (2.6)
Median duration of the disorder (years)	2	3
Median number of diagnoses	2	2
Treatment credibility at pretreatment	9.42 (0.48)	8.98 (1.99)
Treatment credibility at posttreatment	9.74 (0.42)	9.56 (0.8)
Comorbid diagnoses		
None	6	1
Generalized anxiety disorder	3	5
Social phobia	0	2
Major depression	0	3
Dysthymia	2	1
Post-traumatic stress disorder	1	0
Specific phobia	1	0
Borderline personality disorder	0	2
Histrionic personality disorder	0	1

<sup>a</sup> $p < 0.05$ .

scription and a graphic representation of a panic attack were also provided. The panic diaries provided information on (1) the date and time of the panic attack; (2) the duration of the panic (from the onset of the symptoms to the beginning of their reduction); (3) whether the panic was cued or uncued (with description of the cues); (4) the maximum severity using an anchored scale from "0" to "10"; and (5) the list of each of the 13 panic symptoms listed in the DSM-IV.<sup>32</sup> Only panic attacks with more than four symptoms were counted and then averaged over the 4 weeks to provide the mean number of panics per week. Panic apprehension was recorded daily on a separate form with the following anchor points: "none", 0; "minimal", 1–20; "some", 21–40; "average", 41–60; "a lot", 61–80; "extreme", 81–100.

*Self-report outcome measures:* The Agoraphobic Cognition Questionnaire,<sup>33</sup> the Body Sensation Questionnaire,<sup>33</sup> the Mobility Inventory (alone and accompanied versions<sup>34</sup>), and the Self-Efficacy to Control a Panic Attack Scale<sup>35</sup> were used. The first three instruments are standard measures used in outcome studies on PDA, and the last one is a psychometrically sound instrument that has been used successfully in a previous study.<sup>36</sup> Three other measures were used to assess generalization of the results: the State-Trait Anxiety Inventory,<sup>37</sup> the Beck Depression Inventory,<sup>38</sup> and the Sheehan Disability Scale.<sup>39</sup>

*Self-report measures of clinically relevant aspects of videoconference:* The client's perception of the therapeutic alliance between the participant and the therapist was assessed with the Working Alliance Inventory.<sup>31</sup> It yields a total alliance score as well as three subscores: agreement on in-sessions tasks, agreement on treatment goals, and the development of a mutual bond (therapeutic relationship). Treatment credibility was measured pre- and posttreatment using an adapted version of Borkovec and Nau's<sup>40</sup> questionnaire.<sup>36</sup> The five items in this questionnaire are rated from 0 (low credibility) to 10 (high credibility), and then averaged.

### *Procedures*

Patients were diagnosed using the SCID in face-to-face interviews with one of the thera-

pists participating in the study. At both sites, the diagnosing therapist was not necessarily the same one that was assigned as a therapist. Therapist assignment was based solely on schedule compatibility. All other contact between patients at the remote site and therapists was via videoconference or fax.

After the 4-week self-monitoring period, participants at both the local and the remote sites were randomly assigned either to a waiting list (3 months) or to immediate treatment. Because of the small sample size, the data from the immediate and the waiting list conditions were collapsed within each site. Thus, the design is a pretest post-test design with a nonequivalent control group. At the remote site, all patients were treated using videoconference, whereas treatment was delivered only face-to-face at the local site.

CBT was delivered once a week for 12 consecutive weeks by trained therapists: one Ph.D. psychologist (S.B.), one masters psychoeducator (B.P.), and two Ph.D. candidates (V.R. and M.A.). All therapists had a minimum of 1 year of experience with the treatment protocol. The treatment was delivered according to a standardized, explicit treatment protocol adapted from Clark and Salkovskis's<sup>41</sup> and Barlow and Cerny's<sup>42</sup> treatment manuals. The treatment protocol followed these steps: brief case conceptualization, presentation of the cognitive model of panic, application of cognitive-restructuring techniques to the interpretation of body sensations, interoceptive exposure, exposure to agoraphobic situations, and relapse prevention. The therapists provided the participants with written descriptions of key information. Participants were always alone with their therapist (i.e., no one else was with them in the room at the remote site during the therapy sessions).

### *Equipment at the remote site*

The remote videoconference site was equipped with a Tandberg 2500 videoconference system (codec, camera, and NT3 communication port) and a fax (for the transmission of the weekly homework). Images were displayed on a 20-inch television monitor in full-screen. Participants were seated alone in a psychologist's

office at the remote mental health clinic. The local videoconference site was equipped with a Tandberg Delta7 system, which was essentially equivalent to the Tandberg 2500 except for the addition of a document camera. The local and remote sites were linked via six ISDN lines providing 384 kilobits of information per second. This system allowed the patients and the therapists to see each other and to talk with excellent image quality and without significant delays. The therapists were encouraged to use the picture-in-picture function so they could see what the participants were seeing. This visual feedback helped the therapists avoid mistakes such as waving their hands outside the camera's field of view.

### Overview of statistical analyses

To prevent inflation of the Type I error, we applied Bonferroni's adjustments to families of hypotheses. Three families of hypotheses were tested with significance levels fixed a priori: (1) panic attacks and panic apprehension diaries,

with a significance level of 0.05/2; (2) self-report of panic and agoraphobia, with a significance level of 0.05/5; and (3) overall functioning, with a significance level of 0.05/4.

All three families of hypotheses were tested using repeated measures ANOVAs (analyses of variance) (2 conditions  $\times$  4 times). The Huynh-Feldt  $F$  ratio was used because it is corrected with the  $\varepsilon$  index of sphericity.<sup>43</sup> For the main effect of time, a priori repeated orthogonal contrasts were performed; intake was compared to pretreatment, pretreatment to posttreatment, and posttreatment to follow-up. For the interaction of condition and time, only one a priori repeated contrast was performed, assessing change from pre- to posttreatment.

Power analyses were conducted by using the partial  $\eta^2$  provided by SPSS for each effect and by interpreting these values with tables from Cohen<sup>28</sup> for  $f$ , qualitative interpretation of effect-size, and expected number of participants required to test the hypothesis with a power of 0.80 and an  $\alpha$  fixed at 0.05. This level of significance was selected to pro-

TABLE 2. MEAN AND STANDARD DEVIATION FOR PARTICIPANTS RECEIVING FACE-TO-FACE THERAPY AT THE LOCAL SITE (F-TO-F) OR TELEPSYCHOTHERAPY AT THE DISTANT SITE (TELEPSY)  $n = 21$

	<i>Intake</i>		<i>Pretreatment</i>		<i>Posttreatment</i>		<i>Follow-up</i>	
	<i>F-to-F</i>	<i>Telepsy</i>	<i>F-to-F</i>	<i>Telepsy</i>	<i>F-to-F</i>	<i>Telepsy</i>	<i>F-to-F</i>	<i>Telepsy</i>
Panic frequency	0.4 (0.42)	3.2 (2.68)	0.61 (0.42)	3.0 (2.8)	0.01 (0.03)	0.02 (0.06)	0.0 (0.0)	0.01 (0.04)
Panic apprehension	25.89 (13.45)	30.97 (20.78)	21.26 (16.4)	30.93 (20.28)	13.25 (16.38)	4.43 (7.55)	9.39 (15.48)	4.28 (7.63)
Agoraphobic cognition	2.14 (0.37)	2.40 (0.62)	2.08 (0.40)	2.38 (0.66)	1.51 (0.43)	1.21 (0.39)	1.41 (0.41)	1.32 (0.44)
Body sensation	2.9 (0.45)	3.04 (0.71)	2.6 (0.44)	2.65 (1.0)	1.97 (0.66)	1.59 (0.61)	1.88 (0.76)	1.56 (0.33)
Mobility: alone	2.8 (0.96)	2.34 (1.04)	2.56 (1.0)	2.33 (0.60)	1.8 (0.98)	1.5 (0.52)	2.11 (1.25)	1.56 (0.44)
Mobility: accompanied	2.44 (0.89)	1.72 (0.76)	2.04 (0.75)	1.94 (0.59)	1.58 (0.61)	1.32 (0.48)	1.85 (0.96)	1.36 (0.38)
Self-efficacy to control a panic attack	50.79 (21.04)	47.55 (21.09)	49.18 (17.51)	44.53 (19.31)	80.72 (18.60)	73.32 (27.88)	77.48 (24.86)	65.26 (30.11)
State anxiety	40.9 (15.81)	53.88 (9.92)	44.75 (15.26)	50.64 (12.18)	33.8 (8.72)	38.34 (14.49)	34.7 (9.66)	41.56 (17.03)
Trait anxiety	53.7 (13.38)	56.29 (8.38)	48.0 (11.60)	55.03 (10.45)	39.4 (9.98)	39.28 (12.46)	38.50 (9.35)	39.27 (13.61)
Beck Depression Inventory	15.2 (12.11)	23.73 (11.75)	11.2 (7.48)	21.18 (11.08)	6.6 (6.22)	9.27 (10.71)	7.1 (7.14)	10.95 (10.99)
Sheehan DISS	4.26 (2.56)	5.40 (3.11)	3.96 (2.28)	4.89 (2.45)	1.49 (1.39)	1.71 (1.76)	1.07 (1.06)	3.18 (3.66)

vide a fair estimate of the impact of the treatment for each variable as if it were the main outcome variable.

## RESULTS

Results of the face-to-face and telepsychotherapy groups at each assessment period are reported in Table 2. Figure 1 illustrates the results of one variable in each family of statistical analysis. At intake, none of the participants was panic free. At pretreatment, one participant in the face-to-face condition was already panic-free (a participant who was assigned to the waiting list) and two in the telepsychotherapy condition were panic free (one who was assigned to the waiting list, and one who was not). At posttreatment, 90% of the participants in the face-to-face condition were panic free, as were 81% of those in the telepsychotherapy condition. At follow-up, 100% of the participants in the face-to-face condition were panic-free, as were 91% of those in the telepsychotherapy condition (all chi-squared values were not significant).

The working alliance scores of the participants in the telepsychotherapy group were very high at each assessment: 222.2 after the first session, 243.1 after the fifth session, and 242.4 at posttreatment. Scores on the goal subscale were high: 25.2, 27.0, and 27.2 out of 28 after the first, fifth and 12<sup>th</sup> session, respectively. Scores on the task subscale were also high (22.6, 27.1, and 27.2). Most interesting, the scores on the bond subscale were 25.9 after the first session, 27.7 after the fifth session, and 26.8 after the last session.

Table 3 presents the results of the statistical analysis of treatment effectiveness, and of the differences between the face-to face and videoconference groups. In both groups, there was a statistically significant improvement in all measures. There was a difference between the two groups in panic frequency; before treatment, the participants who received telepsychotherapy had more panic attacks per week. There was only one significant group–time interaction over the pre–post interval that met the a priori fixed level of significance. The videoconference group had a greater reduction in

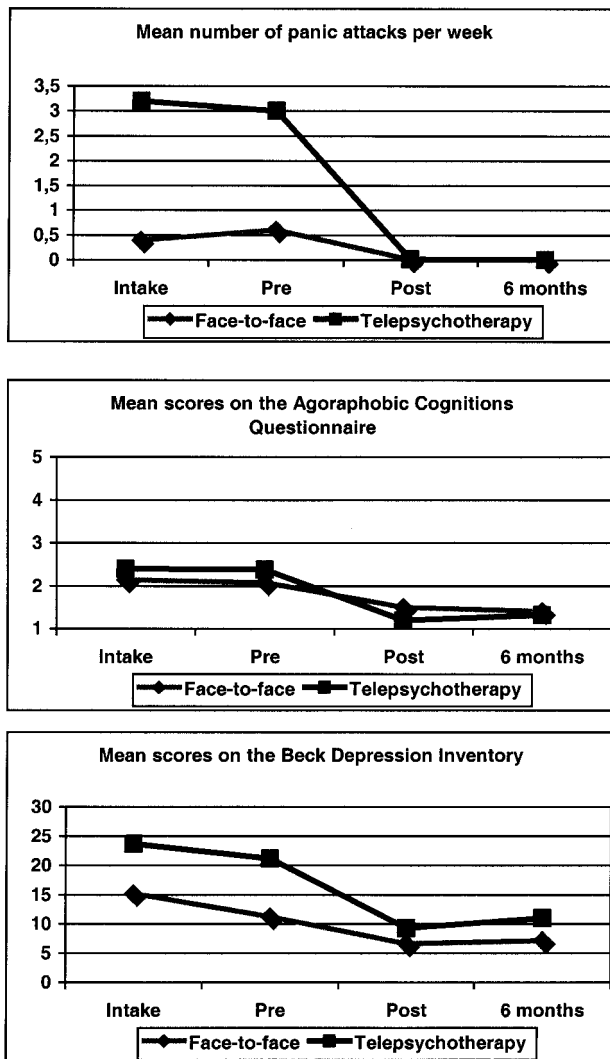


FIG. 1. Effect of face-to-face psychotherapy versus telepsychotherapy in videoconference.

panic frequency than did the face-to-face group. Although significant at  $p = 0.05$ , the interaction for panic apprehension did not reach the 0.025 level of significance, which was fixed a priori.

None of the time contrasts for intake versus pretreatment reached the a priori level of statistical significance, although scores on the Body Sensation Questionnaire and the Trait Anxiety subscale showed some noticeable reductions. This information is valuable because it suggests that the passage of time, be it 1 month of self-monitoring or 3 months on the waiting list, did not adversely affect the participants. The contrasts reflecting the impact of treatment were all significant; both face-to-face

TABLE 3. *f* VALUES FOR THE ANOVAS' MAIN EFFECTS AND THE A PRIORI CONTRASTS

	ANOVA-Main effects			Contrast for time effects			Pre-post interaction contrasts
	Time	Group	Interaction	Intake vs. pretreatment	Pre- to posttreatment	Post to follow-up	
Panic attack frequency	15.41 <sup>b</sup>	8.81 <sup>b</sup>	8.02 <sup>b</sup>	0.0	15.05 <sup>b</sup>	1.87	6.61 <sup>a</sup>
Panic apprehension	24.56 <sup>b</sup>	0.0	3.57	1.6	19.8 <sup>b</sup>	3.45	5.67 <sup>a</sup>
Agoraphobic cognition	33.53 <sup>b</sup>	0.08	2.66	0.35	32.51 <sup>b</sup>	0.0	3.94
Body sensation	27.64 <sup>b</sup>	0.41	1.26	5.24 <sup>a</sup>	18.01 <sup>b</sup>	0.54	1.18
Mobility: alone	18.81 <sup>b</sup>	1.25	0.56	0.77	54.08 <sup>b</sup>	2.41	0.06
Mobility: accompanied	11.18 <sup>b</sup>	2.26	2.32	0.46	26.26 <sup>b</sup>	2.29	0.55
Self-efficacy to control a panic attack	16.68 <sup>b</sup>	0.8	0.28	0.26	33.18 <sup>b</sup>	1.60	0.07
State anxiety	15.16 <sup>b</sup>	1.54	2.82	0.03	21.98 <sup>b</sup>	5.84 <sup>a</sup>	0.07
Trait anxiety	33.87 <sup>b</sup>	0.36	1.25	4.78 <sup>a</sup>	28.19 <sup>b</sup>	0.15	2.43
Beck Depression Inventory	18.47 <sup>b</sup>	2.79	1.87	2.98	37.61 <sup>b</sup>	0.59	7.37 <sup>a</sup>
Sheehan DISS	23.83 <sup>b</sup>	1.34	1.37	0.73	57.56 <sup>b</sup>	1.71	0.89

Note: <sup>a</sup>*p* < 0.05. <sup>b</sup>*p* < 0.01.

psychotherapy and telepsychotherapy were effective. The follow-up contrasts confirmed that gains were maintained after 6 months. Pre- to posttreatment interaction contrasts confirmed that there was little, if any, difference in effectiveness between telepsychotherapy and face-to-face psychotherapy. If a less stringent alpha were used (0.05 rather than 0.01), then these contrasts would indicate that telepsychotherapy was more effective than face-to-face ther-

apy in reducing panic frequency, panic apprehension, and depression.

Table 4 provides an estimate of the sizes of the differences in effectiveness between the treatment conditions. The effect sizes of the treatments were very large, as expected for an outcome study of CBT for PDA. The effect sizes of the interactions were noteworthy. The interactions that were strong, but not significant at the corrected level of significance, were based

TABLE 4. EFFECT SIZES ANALYSES FOR THE MAIN EFFECT OF TIME AND THE INTERACTION (TIME × 2 CONDITIONS) DURING THE TREATMENT PHASE

	Time effect			Interaction			Expected n <sup>a</sup>
	Eta squared	f	Effect size	Eta squared	f	Effect size	
Panic attack frequency	0.44	0.89	Very large	0.26	0.59	Large	25
Panic apprehension	0.51	1.02	Very large	0.23	0.55	Large	30
Agoraphobic cognition	0.63	1.32	Very large	0.17	0.45	Large	44
Body sensation	0.59	1.20	Very large	0.06	0.25	Medium	128
Mobility: alone	0.74	1.72	Very large	0.00	0	Trivial	>3000
Mobility: accompanied	0.58	1.18	Very large	0.03	0.18	Small	258
Self-efficacy to control a panic attack	0.64	1.35	Very large	0.00	0	Trivial	>3000
State anxiety	0.54	1.09	Very large	0.00	0	Trivial	>3000
Trait anxiety	0.60	1.22	Very large	0.11	0.35	Medium	66
Beck Depression Inventory	0.66	1.43	Very large	0.28	0.62	Large	26
Sheehan DISS	0.76	1.81	Very large	0.05	0.23	Small	156

<sup>a</sup>Expected sample size required to test the difference in effectiveness of telepsychotherapy and face-to-face with a power of 0.80 and a significance level set at 0.05.



on large effect sizes. These interactions would have been significant if either the sample were larger or if significance level had not been corrected for the risk of type I error. Three of the interactions reached the traditional 0.05 significance level, and their power levels ranged from 0.62 to 0.73. None of these interactions suggested that telepsychotherapy was less effective than face-to-face. For most of the other variables, however, the differences between face-to-face psychotherapy and telepsychotherapy were small or trivial.

## DISCUSSION

The results of this study give no indication that videoconference telepsychotherapy is any less effective than face-to-face psychotherapy. Participants in both groups showed significant improvement in panic symptoms (panic frequency and panic apprehension), panic-related characteristics (catastrophic beliefs, fear of sensations, and perceived self-efficacy), agoraphobic avoidance, general anxiety, depressive affect, and general functioning. At the end of therapy, many of those who could not travel far from their village reported driving to Ottawa, Montréal, or Toronto—trips of as much as 700 kilometers to metropolitan communities with populations of over a million.

Our initial hypothesis was that the effect sizes for the comparisons between the face-to-face and videoconference treatments would be small. It is surprising to see that some measures show large effect sizes favoring telepsychotherapy. However, these results should not be over interpreted because they can be attributed to the lack of random assignment, or to pretreatment differences between the local and remote groups; the telepsychotherapy participants had a lower number of years in school, and higher pretreatment panic frequency. It is also possible that because of the relative dearth of services available at the remote site, the participants may have been better motivated. They may also have been motivated by the novelty of the videoconference technology. Therefore, it is not clear if the results would have been the same if the telepsychotherapy participants had been recruited from a technologically soph-

isticated metropolitan community. It will be important, therefore, for other researchers to replicate this study. The present study's limitations notwithstanding, these results indicate that videoconference telepsychotherapy is an effective tool for the delivery of empirically validated treatment.

The effectiveness of CBT delivered by videoconference is not surprising because CBT has already been shown to be effective when administered by telephone,<sup>22,23</sup> and by computer.<sup>44</sup> On the other hand, the strong success of telepsychotherapy in the present study is somewhat surprising because the participants did not seem especially inclined to use such innovative technology. Most of them presented with frequent panic attacks, agoraphobia, and co-morbid difficulties including affective disorders and personality disorders.

A strong therapeutic alliance is often considered a prerequisite for effective CBT,<sup>45,46</sup> so the rapid development of the alliance in the present study is an important finding. After the first session, the scores on all three dimensions of the alliance were already very high. Even the scores on the bond subscale, which measures emotional attachment, started at a mean of 26 out of a maximum of 28 after one session, and then rose to 27 after five sessions and at post-treatment. The comparison between the post-treatment alliance data of the two conditions does not show any difference between the face-to-face and videoconference conditions. The usefulness of this information, however, may be limited because the alliance was not measured early in the treatment.<sup>30,31</sup> Given what is already known, adequate therapeutic alliances were to be expected; it is well documented that cognitive-behavior therapists develop strong alliances with their patients.<sup>47</sup> Furthermore, therapeutic alliance scores were high in previous videoconference telepsychotherapy studies,<sup>12,13</sup> although not as high as in the current study. A recent report<sup>48</sup> suggests that therapeutic alliances can develop even when psychotherapy is delivered via an Internet chat line. Nevertheless, it is surprising that the bond subscale scores in the present study were so nearly maximal.

It is unclear why the therapeutic alliance scores were so high in the present study. It is

possible that the therapists made a special effort to nurture strong therapeutic alliances and bonds, or that they avoided strain in the therapeutic alliance.<sup>49</sup> The use of the picture-in-picture function may also have contributed to the alliance because it gave the therapists continuous visual feedback on their performance.

The strong alliances documented in this study may best be explained in terms of sense of presence, a promising new concept that is central to the study of virtual reality.<sup>50</sup> Presence is defined as "the subjective experience of being in one place or environment, even when one is physically situated in another. As described by teleoperators, presence is the perception of being at the remote worksite rather than at the operator's control station."<sup>51</sup> In a telepsychotherapeutic context, presence refers to the impression of really being in therapy with the patient rather than being in a physically different location. In the present study, considerable anecdotal evidence of presence was observed during the telepsychotherapy sessions. For example, participants made comments such as, "I'm glad you are here, it helps me so much," and they often reported forgetting that they were not in the same room with their therapist. All the therapists in this study reported experiencing feeling immersed "in" therapy, and that they were not distracted by the fact that they were conversing with a video camera and monitor. The therapists believed that this strong sense of presence greatly facilitated the creation of therapeutic bonds. Bouchard *et al.* proposed a model that explained how beliefs regarding telepsychotherapy and presence might affect communication patterns in therapy.<sup>15</sup> They suggested that the combination of positive beliefs regarding telepsychotherapy with a strong sense of presence allow effective therapeutic alliances to develop. Clearly, more research in this area is needed, especially in the measurement of presence in telehealth and in presence's contribution to treatment outcome.

The present study indicates that videoconference telepsychotherapy may be a viable alternative to face-to-face psychotherapy, and that it may therefore play an important role in the delivery of services to under-served populations. Before telepsychotherapy becomes more

widely used, however, a number of issues must be addressed. One of these is the applicability of videoconference telepsychotherapy to other disorders and to other types of therapy. The results of the present study cannot be generalized beyond CBT or PDA because other mental disorders and other therapies may be incompatible with telepsychotherapy. For example, people with generalized anxiety disorder may be preoccupied by the possibility of technical problems occurring during the session, and people with social phobia may benefit more from therapy if it includes concrete social interactions such as shaking hands. People with schizophrenia may require face-to-face therapy if conversing with a television monitor interferes with reality testing, and severely depressed or suicidal people may have difficulty engaging with a televised therapist. Other psychotherapeutic approaches should also be rigorously tested in videoconference. For example, interpersonal therapy has received evidence-based support for its effectiveness in major depression,<sup>16</sup> but it has not been tested in videoconference.

Resource allocation is another issue that must be addressed. For fiscal and logistical reasons, it may be tempting to substitute telepsychotherapeutic services for on-site, face-to-face services. In the course of this study, however, it was found that the services provided by the professionals at the remote site were irreplaceable adjuncts to telepsychotherapy. The participants at the remote site and the therapists at the local site were all glad that caring people were at the remote site to accompany the participants to the videoconference office and to help them with minor technical difficulties. Clinical support at the remote site is also essential. When a suicidal participant presented at the remote site's emergency room in crisis, the telepsychotherapists depended on the presence of the mental health professionals to provide hands-on support. When developing telepsychotherapeutic programs, it is therefore imperative to make provision for professional on-site support.

The impact that telepsychotherapy may have on the profession of clinical psychology is yet another important issue. The removal of geographical limitations has important implica-

tions for licensing, liability, and accountability.<sup>52</sup> Accountability is especially important because, so far, there is little evidence that delimits the disorders, therapies, or populations for which telepsychotherapy is appropriate. As telepsychotherapy becomes more widespread, it will have a profound effect on the profession of psychology because it will force local clinicians to compete in a global market. Those who are unfamiliar with the empirically validated treatments that clients demand will be compelled to upgrade their skills to maintain the viability of their practices.

Cost is becoming less of an issue. At present, high-quality audio and video communication requires expensive equipment and costly long distance telephone service. However, broadband cable access to the Internet already provides up to 500 kilobits per second, more than enough to conduct telepsychotherapy in videoconference with a quality similar to that of the current study. There are still important technical hurdles because information on the Internet is broken into packets at the sender's end. Each packet travels by a different route to the receiver's end, and then the information is reconstructed. This may cause important delays, and may significantly degrade the quality of the videoconference if quality of service (QOS) is not built into the system. With the introduction of new technologies such as Internet2,<sup>53</sup> it is expected that Internet-based videoconference will become a viable, inexpensive alternative to telephone-based videoconference with built-in QOS.

With reductions in costs and increasing demands for treatment accessibility, interest in telepsychotherapy is on the rise. Therefore, clinicians and researchers should work actively to delineate the parameters guiding the application of telepsychotherapy, and to document rigorously its effectiveness with a wide variety of disorders.

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Address reprint requests to:  
Dr. Stéphane Bouchard  
Département de psychoéducation et de  
psychologie  
Université du Québec en Outaouais  
P.O. Box 1250  
Station Hull  
Gatineau, Quebec J8X 3X7  
Canada

E-mail: [stephane.bouchard@uqo.ca](mailto:stephane.bouchard@uqo.ca)