

Clinical Usefulness of a Simulated Exposure Treatment for Fear of Flying¹

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ABSTRACT. The aim of this paper is to assess the clinical usefulness of a computer assisted exposure treatment for fear of flying, which already proved to be effective in laboratory, controlled conditions. Two studies, one in Mallorca (S1, N= 12) and the other one in Germany (S2, N=8), were conducted. Patients were recruited using advertisements in the airport (S1) or in local newspapers (S2), and they were individually treated. Data on fear of flying were collected before treatment, after computer assisted exposure, and after a post-treatment actual flight. Several results corroborated the clinical usefulness of the treatment: (a) effective exposure time was quite similar in both studies; (b) nineteen out of 20 patients completed treatment and took the actual flight; (c) the main fear reductions were found after computer exposure and before taking the flight; and (d) therapeutic changes were clinically significant in most cases: 91.7% of patients in S1, and 87.5% in S2 improved or recovered. We conclude that the clear structure of the computer assisted program facilitates its application in very different settings. Moreover, therapists need only little training to use the program successfully.

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KEYWORDS. Computer. Exposure. Clinical Usefulness. Fear of Flying.

RESUMEN. El objetivo de este trabajo es evaluar la utilidad clínica de un tratamiento de exposición asistido por ordenador para el miedo a volar que se había mostrado eficaz en condiciones controladas de laboratorio. Se llevaron a cabo dos estudios, uno en Mallorca (E1, N=12) y otro en Alemania (E2, N=8). Los pacientes se captaron mediante anuncios en el aeropuerto (E1) y en la prensa local (E2) y fueron tratados individualmente. Se recogieron datos del miedo antes, después del tratamiento de exposición y después de un vuelo real post-tratamiento. Varios resultados corroboran la utilidad clínica del programa: (a) el tiempo efectivo de exposición fue muy similar en ambos estudios; (b) 19 de los 20 pacientes finalizaron el tratamiento y tomaron el vuelo real; (c) las principales reducciones del miedo se hallaron después de la exposición y antes del vuelo real; y (d) los cambios terapéuticos fueron clínicamente significativos en la inmensa mayoría de casos: el 91,7% de pacientes en E1 y el 87,5% en E2 mejoraron o se recuperaron. Se concluye que la clara estructura del programa asistido por ordenador facilita su aplicación en ámbitos muy diversos. Además, el entrenamiento necesario para poder usarlo con éxito es breve.

PALABRAS CLAVE. Ordenador. Exposición. Utilidad clínica. Miedo a volar.

RESUMO. Este trabalho tem como objectivo avaliar a utilidade clínica de um tratamento de exposição assistida por computador para o medo de viajar de avião, o qual se mostrou eficaz em condições controladas em laboratório. Foram realizados dois estudos, um em Mallorca (E1, N=12) e outro na Alemanha (E2, N=8). Os pacientes foram recrutados através de anúncios colocados em aeroportos (E1) e na imprensa local (E2) e foram tratados individualmente. Recolheram-se dados sobre o medo antes, depois do tratamento de exposição e depois de uma viagem real de avião pós-tratamento. Vários resultados corroboram a utilidade clínica do programa: (a) o tempo efectivo de exposição foi muito similar em ambos os estudos, (b) 19 dos 20 pacientes finalizaram o tratamento e fizeram uma viagem real de avião; (c) as principais reduções do medo verificaram-se depois da exposição e antes da viagem real; e (d) as mudanças terapêuticas foram clinicamente significativas na grande maioria dos casos: 91,7% dos pacientes de E1 e 87,5% E2 melhoraram ou recuperaram. Conclui-se que a estrutura clara do programa assistido por computador facilita aplicação em âmbitos muito diversos. Além disso, o treino necessário para o poder usar é breve.

PALAVRAS CHAVE. Computador. Exposição. Utilidade clínica. Medo de viajar de avião.

Introduction

New technologies have opened a wide range of innovative practical applications of cognitive behavior therapy (McMinn, 1998). The first Internet based treatments for behavioral disorders have been published recently (Lange *et al.*, 2000a; Lange, Van de

Ven, Schrieken, Bredeweg, and Emmelkamp, 2000b), and computer assisted treatments (including virtual reality) have been developed (Botella, Baños, Perpiñà, and Ballester, 1998a; Riva, Wiederhold, and Molinari, 1998). Computer assisted treatments may be classified in four groups: (a) Computerized versions of self-help programs as well as computerized guidelines for self-application with minimal therapeutic contact were developed to treat phobias (e.g. Ghosh and Marks, 1987; Newman, Kenardy, Herman, and Taylor, 1997b) (Ghosh, Marks, and Carr, 1988), other anxiety disorders (e.g. Newman, Consoli, and Taylor, 1999), depression (Selmi, Klein, Greist, Sorrell, and Erdman, 1990), obesity, alcoholism and substance abuse (Burnett, Magel, Harrington, and Taylor, 1989; Hester and Delaney, 1997; Moncher *et al.*, 1985; Taylor, Agras, Losch, Plante, and Burnett, 1991); (b) treatment programs administered through the telephone using interactive voice answer technology have been used by one research group to treat mild depressive disorders (Osgood-Hynes *et al.*, 1998) or obsessive compulsive disorders (Marks *et al.*, 1998); (c) treatment programs that use computers to create a natural environment associated with the patient's problem were developed mainly as part of exposure treatments for anxiety disorders. Older studies using slides and cassette recorded sounds or video tapes to treat fear of flying (Denholtz and Mann, 1975; Solyom, Shugar, Bryntwick, and Solyom, 1973) or other anxiety disorders (Berggren and Carlsson, 1984; Marks, 1975) revealed good outcomes and can be considered historical antecedents of modern computer based exposure treatments. Yet, the first computer assisted exposure study by Nelissen, Muris, and Merckelbach (1995) failed to ameliorate spider fear in two children. However, this program used rudimentary technology, no personalized exposure hierarchy, and exposure duration was just one hour. The more sophisticated program developed by Coldwell and colleagues (Coldwell *et al.*, 1998) to treat fear of dental injections compensated for these shortcomings and in addition included relaxation training and cognitive procedures to control activation, and a module for the dentist to guide the patient through *in vivo* exposure after completing the computer assisted exposure. This program proved to be effective at the end of the intervention and at one-year follow-up; (d) computer generated virtual realities were used as part of exposure treatments. Several case studies and clinical trials revealed promising outcomes (e.g. Botella *et al.*, 1998b; Carlin, Hoffman, and Weghorst, 1997; North, North, and Coble, 1995; Rothbaum *et al.*, 1995a; Rothbaum *et al.*, 1995b; Rothbaum, Hodges, Watson, Kessler, and Opdyke, 1996; Wiederhold, Gervitz, and Wiederhold, 1998), and some recently completed or ongoing controlled group studies also demonstrated its efficacy for the treatment of phobias (Botella, Baños, Villa, Perpiñà, and García-Palacios, 2000; Mühlberger, Herrmann, Wiedemann, Ellgring, and Pauli, 2001; Rothbaum *et al.*, 1995a) (e.g. Baños *et al.*, 2000a; Emmelkamp, 2000). However, virtual reality equipment is still rather expensive, and this approach may not be feasible for clinical practice.

The Computer-Assisted Fear of Flying Treatment (CAFFT), developed by Bornas and colleagues, belongs to the third group of computer assisted programs. CAFFT is a computerized exposure treatment -it is well known that exposure is a key element for an effective reduction of fear of flying (see Tortella-Feliu and Fullana, 2001 for a review of flight phobia treatments)- that requires little therapist involvement and may

be completed within about four hours of actual exposure (see the appendix for a detailed description of CAFFT). A first case study of CAFFT revealed clinically significant reductions of fear of flying (Bornas, Fullana, Tortella-Feliu, Llabrés, and García de la Banda, 2001a). In a succeeding controlled group study, CAFFT was compared with a multi-component treatment group which received relaxation training and aeronautical information in addition to the simulated exposure provided by the CAFFT and a waiting list control group. Reduction in fear of flying was comparable in both treatment groups and significantly greater than in the waiting list group. However, additional outcome measures assessed after treatment and at one year follow-up revealed greater efficacy of CAFFT compared to the multi-component treatment (Bornas, Tortella-Feliu, Fullana, and Llabrés, 2001b). Therefore, CAFFT can be considered an efficient treatment for fear of flying, at least when conducted in highly controlled (laboratory) conditions.

As suggested by Agras and Berkowitz (1980), Kazdin (1994) and Salkovskis (1995), a treatment proved to be effective in controlled laboratory studies has to be further examined regarding three essential and interrelated questions. First, treatment components and their interactions that are responsible for the observed treatment changes have to be identified in order to refine the intervention procedure. Second, feasibility of the treatment program for clinical practice has to be demonstrated. Third, ways to disseminate the treatment have to be explored. Although it is generally acknowledged that these research steps have to be completed before new treatments should be used in clinical practice (Roth and Fonagy, 1996), few treatment techniques or procedures have been examined in this way. Results from controlled laboratory studies cannot be generalised to clinical settings, mainly because the procedures used to ensure internal validity of experimental studies simultaneously reduce ecological validity (Persons and Silberschatz, 1998). However, there is no agreement on how to demonstrate the clinical usefulness of new treatments. Some authors conclude that controlled and randomised studies are not appropriate (e.g. Seligman, 1995; Street, Niederehe, and Lebowitz, 2000; Strosahl, Hayes, Bergan, and Romano, 1998), while others consider this to be the main strategy to assess clinical usefulness (e.g. Barlow and Hofmann, 1997; Borkovec and Castonguay, 1998; Chambless and Hollon, 1998; Hamilton and Dobson, 2001). Yet, the need to demonstrate a treatment's effectiveness and not only its efficacy is generally acknowledged.

The present paper describes two studies designed to examine the clinical usefulness of the CAFFT program. In contrast to the previously conducted experimental treatment study (Bornas *et al.*, 2001b), treatments were performed by two young therapists without clinical experience. In addition, both therapists were not involved in the development of the CAFFT, and therefore had no background knowledge about how to use CAFFT. Both studies were performed in "non-laboratory" treatment settings. Study 1 was carried out at an office in the airport of Palma, Spain, while study 2 was conducted at the University Clinic of Psychiatry and Psychotherapy of Tübingen, Germany. Finally, in study 2 in Germany visual exposure scenes were projected with a LCD devices on a large screen in front of patients, like in the previous laboratory study (Bornas *et al.*, 2001b). In contrast, study 1 in Spain presented exposure scenes on a regular computer screen. This was done because large screen projections, presumable, will not be available in most private practices. The treatments conducted in Germany and in Spain were

greatly comparable, although differed in language (German versus Catalan). In addition, few pictures (see appendix) with obvious cultural signs were replaced (e.g. pictures of Spanish airports were replaced by pictures of German airports when written signs appeared). The structure of the CAFFT program was unaffected.

STUDY 1

Method

Subjects

Twelve patients with specific phobia (type “fear of flying”) according to DSM-IV. Nine were female (75%) and three were male (25%). The mean age was 39.08 years (SD=5.31). Three patients who also sought treatment for fear of flying were excluded because of additional psychological problems (e.g. depression).

Measures

- The Fear of Flying Questionnaire (FFQ-II) (Bornas, Tortella-Feliu, García de la Banda, Fullana, and Llabrés, 1999) measures severity of fear of flying. 30 items describe different flying-related situations (e.g. “I am packing up at home”; “I get the boarding card at the airport”; “The plane accelerates and I feel how it takes off”) and patients rate their fear or discomfort in these situations on nine point rating scales (1 meaning “no fear”, and 9 meaning “extreme fear”). The original Catalan version was used.
- The Fear of Flying Scale (FFS) (Haug *et al.*, 1987) also assesses severity of fear of flying and consists of 21 items describing situations representative for air travelling. The fear elicited by the described situations is rated on five-point scales (not a little (0), a little (1), a fair amount (2), much (3), and very much (4)). A Catalan translation of the questionnaire was used.
- General Discomfort was assessed with a 0-10 point scale (0 meaning no discomfort, and 10 meaning extreme discomfort).
- Avoidance of flying was assessed with a 0-10 point scale (0 meaning not at all, and 10 meaning extreme).

Therapist

The therapist was a 25 years-old female psychologist with less than one year of clinical experience. She was taught how to use the software and to conduct the structured interview and the treatment procedure by an expert researcher. This training lasted about five hours. She could contact with the software developers and the research group whenever she needed it.

Procedure

Posters and brochures announcing the availability of CAFFT treatment and a contact phone number were displayed around the Palma airport. People who called this number were seen by therapist few days later. Patients were interviewed individually at the Fear

of Flying Unit located in the sixth floor of the airport building. Interviews lasted about one hour and included a structured diagnostic interview based on ADIS-IV (DiNardo, Brown, and Barlow, 1994) and completion of the FFS, the FFQ, the General Discomfort Scale and the Flying Avoidance Scale (pre-treatment assessment). Patients were asked for sign consent forms informing them that they could stop the treatment at any point. The CAFFT exposure treatment (see appendix for details) took place in the same Unit. Treatment sessions were individually appointed. During each session, patients were seated in front of a 21" computer screen and were instructed by the therapist to carefully look at the images and listen to the related sounds through the headphones. Each exposure session lasted about one hour, although the therapist avoided to end sessions if patients were still experiencing too much discomfort with the actual exposure sequence. CAFFT exposure treatment lasted until the patient did not feel anxious when exposed to any of the five exposure sequences. After the last session, the therapist administered the FFQ, the FFS, and the General Discomfort Scale again (post-CAFFT assessment). Then, an actual round-trip flight to Barcelona (30 min.) and back to Palma (flights within a day) with the therapist was scheduled for one of the next days. Patients were asked to buy their ticket at the airline's airport office. Patients paid only 50% of the ticket price, and this was the actual cost of the whole treatment for them (60 Euros). The therapist did not seat by the patient during the flight. After arrival in Palma airport, patients completed the FFQ, the FFS, the General Discomfort Scale and the Flying Avoidance Scale (post-flight assessment). General Discomfort was rated according to the discomfort experienced during the flights.

Results

All 12 patients who started treatment completed it as well as the actual flights. The mean time of exposure (meaning the time the patient remained seated in front of the computer) was somewhat more than three hours (189.92 minutes; $SD=64.02$; range 91-303 minutes). Treatment caused significant decreases in fear of flying as reflected in three measures: FFQ ($F=40.39$, $p<.0001$), FFS ($F=23.11$, $p<.0001$) and General Discomfort ($F=21.06$, $p<.0001$) (see Table 1). Post-hoc contrasts revealed significant differences between pre-treatment and post-CAFFT assessments and between pre-treatment and post-flight assessments for all three measures. Differences between post-CAFFT and post-flight assessments were only significant for the FSS, but not for the FFQ or the General Discomfort scale. Flying Avoidance scale ratings significantly decreased from pre-treatment ($M=6.50$; $SD=3.06$) to post-flight ($M=3.00$; $SD=2.13$) assessments ($t=3.01$, $p<.05$; this measure was not taken at post-CAFFT assessment).

TABLE 1. Self-reported measures of fear of flying and general discomfort before treatment, after treatment, and after flight (N=12), study 1.

| | PreCAFFT | | PostCAFFT | | PostFLIGHT | | F | Contrast |
|--------------------|----------|-------|-----------|-------|------------|-------|----------|-------------|
| | M | SD | M | SD | M | SD | | |
| FFQ | 176.92 | 32.10 | 95.00 | 41.28 | 85.42 | 24.90 | 40.39 ** | 1-2/1-3 |
| FFS | 53.50 | 10.86 | 36.58 | 12.70 | 27.08 | 12.86 | 23.11 ** | 1-2/1-3/2-3 |
| General Discomfort | 8.25 | 1.35 | 3.41 | 1.92 | 3.25 | 2.22 | 21.06 ** | 1-2/1-3 |

**p.<.001; FFQ = Fear of Flying Questionnaire; FFS = Fear of Flying Scale

To test whether the outcome results were clinically meaningful two statistical measures were used (Jacobson and Truax, 1991): the reliable change index and the clinical significance index. As relevant outcome measure, FFQ scores were selected. To assess the reliability of the therapeutic change we used the previously known test-retest reliability of the FFQ ($r = .97$), and the standard deviation of a non-phobic sample ($S = 30.79$; $M = 65.24$; $N = 454$) to calculate the standard error of the measure $S = s \sqrt{1-r}$. Then we calculated the standard error of the difference = $\sqrt{2(S)^2}$. For a therapeutic change to be reliable, the resulting value of dividing the difference between pre- and post-treatment by the standard error of the difference must be greater than 1.96. In addition, the patient's post-treatment scores had to be decreased by, at least, two standard deviations from the pretreatment scores in order to say that the clinical change had been clinically significant. According to Jacobson's categories, one patient did not change (8.3%), two patients improved (16.7%), and nine patients recovered (75%).

STUDY 2

Method

Subjects

Eight patients with specific phobia (type "fear of flying") according to DSM-IV were treated in Tübingen at the University Clinic of Psychiatry and Psychotherapy. Seven were female (87.5%) and one was male (12.5%). The mean age was 38.75 years ($SD = 11.96$). One patient who also sought treatment for fear of flying was excluded because of additional psychological problems (e.g. depression).

Measures

The same measures as described in study 1 were used. Questionnaires were in German.

Therapist

The therapist was a 28 years-old female psychologist who just finished her diploma studies and had almost no clinical experience. She was taught how to use the software and to conduct the treatment procedure by an expert researcher. This training lasted about five hours. She could contact with the research group whenever she needed it and she attended a supervision session once a week lasting about one hour.

Procedure

Advertisements in local newspapers informed about an ongoing fear of flying study at the University Clinic of Psychiatry and Psychotherapy. Interested persons could contact the therapist by phone. Persons feasible for treatment were invited for a first interview session, and the questionnaires were mailed to them with the request to bring them answered to this session. Patients were interviewed individually at the University Clinic of Psychiatry and Psychotherapy patients. Interviews lasted about one hour. A structured diagnostic interview was conducted. The study was explained to patients and they were asked for sign consent forms informing them that they could stop the treatment at any point. The CAFFT exposure treatment (see appendix for details) took place in the same clinic. Treatment sessions were individually appointed. Exposure sessions were greatly comparable to study 1 with the following differences. Exposure stimuli were presented on a large projection screen (about 1.5 metres visual diagonal) in front of the patients. At the end of the last session, actual round-trip flight from Stuttgart to Berlin (45 min.) and back with the therapist was scheduled for one of the next days. Patients flew in groups of three accompanied by the therapist. Each patients paid the own ticket and one third of the therapist's ticket (since patients flew in groups of three, this covered the therapists ticket), and this were the actual cost of the whole treatment for patients (230 Euros). Tickets were bought by the therapist. The therapist did not seat by the patient during the flight. Back at the Stuttgart airport, patients completed the FFQ, the FFS the General Discomfort Scale and the Flying Avoidance Scale (post-flight assessment). General Discomfort was rated according to the discomfort experienced during the flights.

Results

Seven out of eight subjects completed the treatment as well as the actual flights. The mean time of exposure was 192.5 minutes (SD=49.24; range 118-267 minutes). Treatment caused significant decreases in fear of flying as reflected in three measures: FFQ ($F=17.99$, $p<.0001$), FFS ($F=10.78$, $p<.01$) and General Discomfort ($F=21.03$, $p<.0001$) (see Table 2). Post-hoc contrasts yielded significant differences between pre-treatment and post-CAFFT assessment as well as between pre-treatment and post-flight assessment for all three measures. Differences between post-CAFFT and post-flight

assessments were only significant for the General Discomfort Scale, but not for the FFQ or the FFS. Flying Avoidance Scale ratings significantly decreased from pre-treatment (M=5.88; SD=3.91) to post-flight (M=1.86; SD=2.91) assessments ($t=2.74$, $p<.05$).

TABLE 2. Self-reported measures of fear of flying and general discomfort before treatment, after treatment, and after flight (N=7), study 2.

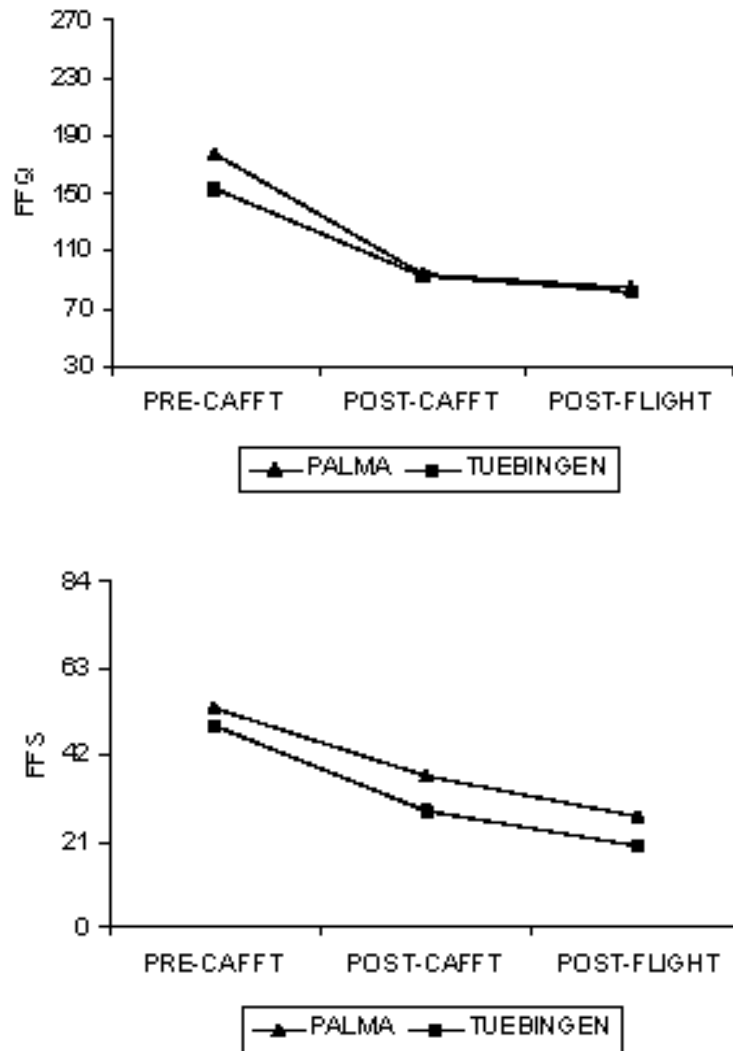
| | PreCAFFT | | PostCAFFT | | PostFLIGHT | | F | Contrast | |
|--------------------|----------|-------|-----------|-------|------------|-------|-------|----------|-------------|
| | M | SD | M | SD | M | SD | | | |
| FFQ | 164.00 | 24.21 | 94.86 | 38.54 | 81.71 | 36.65 | 17.99 | ** | 1-2/1-3 |
| FFS | 49.17 | 10.11 | 26.50 | 12.09 | 19.00 | 13.90 | 10.78 | * | 1-2/1-3 |
| General Discomfort | 8.57 | .78 | 5.28 | 2.75 | 2.85 | 1.95 | 21.03 | ** | 1-2/1-3/2-3 |

* $p<.01$, ** $p<.001$; FFQ = Fear of Flying Questionnaire; FFS = Fear of Flying Scale

To test whether the outcome results were clinically meaningful, the same procedure described in study 1 was used: one patient (12.5%) did not change, 4 patients improved (50%) and 3 recovered (37.5%).

Comparison between studies

Comparisons between studies should be considered as preliminary because of different study conditions. Treatment conditions, as reflected in actual CAFFT exposure time, were quite similar in both studies ($t=.096$, n.s.). In addition, inspection of Tables 1 and 2 indicated that fear reductions were very comparable between studies (see Tables 1 and 2, and Figure 1). Statistical analysis confirmed this observation. Patients of both studies did not differ in any fear of flying measure at pre-treatment assessment [FFQ ($t=1.45$, n.s.), FFS ($t=.815$, n.s.), General Discomfort scale ($t=.472$, n.s.), Flying Avoidance scale ($t=.401$, n.s.)], post CAFFT assessment [FFQ $t=.111$, n.s.; FFS $t=1.48$, n.s.; General Discomfort scale $t=1.83$, n.s.] or post flight assessment [FFQ $t=.263$, n.s.; FFS $t=1.21$, n.s.; General Discomfort scale $t=.388$, n.s.; Flying Avoidance scale $t=.987$, n.s.]. The same is true for the distributions of patient among the three categories of clinical change (no change, improvement, and recovery). Despite a higher percentage of recovered patients in study 1 (75%) compared to study 2 (37.5%), this difference did not reach significance ($c^2(2)=2.99$, n.s.).

FIGURE 1: FFQ and FFS scores evolution in both studies.

FFQ = Fear of Flying Questionnaire; FFS = Fear of Flying Scale

Discussion

The two studies reported here are an additional step in the process of clinical research necessary to prove the clinical usefulness of the CAFFT treatment. Study 1 was carried out in an applied clinical setting, an office at the airport, and CAFFT was run

on a commercially available “average” computer. Results clearly demonstrated the effectiveness of CAFFT in this setting. Fear of flying decreased significantly due to treatment as reflected in all relevant psychometric measures (i.e. FFQ, FFS, general discomfort scale, avoidance scale). Furthermore, clinical significance of therapeutic changes calculated on the basis of FFQ scores showed that 75% of the patients recovered.

Study 2 examined a newly translated German version of CAFFT in an experimental setting run on a computer with beamer options and a large projection screen. Again, CAFFT was found to be effective in reducing fear of flying and all four fear of flying measures decreased due to treatment. Clinical significance of therapeutic changes were found for all but one patient, and 37.5% of the patients recovered. Percentage of recovered patients was somewhat lower in study 2 than in study 1, but statistical analysis revealed no differences in treatment efficacy between studies. Based on the facts that studies differed in treatment settings as well as cultural environment, these slight and not significant differences in treatment outcome rather emphasize the robustness of CAFFT.

In both studies, treatments were performed by rather inexperienced therapists who were not involved in the development of CAFFT, and they only received a brief training on the usage. Yet, treatment effectiveness was good, and the found changes in fear of flying were comparable to previous efficacy studies (Bornas *et al.*, 2001b; Fullana, 2000). It seems that CAFFT may be effectively used by most clinical psychologists disregarding of their clinical experience and even their knowledge on fear of flying.

This conclusion gets further support by the fact that both studies – despite the above mentioned differences - found quite similar exposure durations. Comparable exposure durations were also found in previous studies with CAFFT performed by experienced clinicians who were members of the fear of flying research group and involved in the development of the program (Bornas *et al.*, 2001a; Bornas *et al.*, 2001b). These findings seem to be especially noteworthy since exposure duration is not defined by the program but may vary substantially between patients. Variations can be due to different exposure hierarchies and repetitions of exposure sequences on the basis of individual necessities. In addition, the program allows the therapist to present any exposure sequence non-automatically based on his clinical judgment. Again, we conclude that the clear structure of CAFFT allows that this program can be effectively used in very different settings and that therapists need only little training. Behavioral interventions are especially feasible for computerization because of its intrinsic characteristics (specificity, step by step procedures, etc.) (Newman, Consoli, and Taylor, 1997a), and this may be one of the reasons for the efficacy of CAFFT.

Nevertheless, future research on CAFFT has to address the following issues in order to further improve and evaluate its clinical usefulness: Firstly, specific written guidelines for the therapists’ have to be developed. Secondly, it seems necessary to study whether and which patient needs to be accompanied by the therapist during the first in vivo flight after therapy. These “graduation” flights after therapy are difficult to realize for most clinicians and substantially increase treatment expenses. Therefore, the development of criteria that indicate whether the patient can perform a graduation flight alone or not, would be very helpful (e.g. amount of fear reduction due to CAFFT). Finally, future research has to focus on the development of a self-administered version

of the CAFFT which only requires brief contact between patient and therapist. Such a treatment program would help to further reduce treatment expenses and would improve treatment accessibility.

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APPENDIX 1. CAFFT software description.

The rationale for CAFFT is as follows: Air travel can be conceptualized as a series of chronological events with critical moments. CAFFT divides air travel into four sequential stages: (1) preparation for travel, (2) preflight activities the day of the flight, (3) boarding the plane and take off and (4) the descend of the plane and landing. Though most people with flight phobia usually experience anxiety during all aspects of air travel, most patients experience idiosyncratic patterns of anxiety intensity throughout the flight experience. That is, they fear certain critical moments more than others. CAFFT was designed to be presented to the patient according to his or her fear profile. The program creates a fear hierarchy exposing the patient to each stage of flying from his or her least feared stage to his or her most feared stage. Each stage of flight consists of a chronological series of photographs (at home, at the airport, walking onto the plane, etc.) with paired sounds taken in real settings. For example, the flight preparation sequence starts with 3 pictures of windows of three different travel agencies and appropriate street noise. The next picture was taken inside one of these travel agency shops and the patient hears typical office sounds. This sequence continues with pictures showing an open suitcase on a bed, the suitcase closed and ready near the door and ends with a picture of the airport bus in the street. In addition to these four sequences, the CAFFT also includes a fifth sequence of pictures and matching audio stimuli related to aircraft accidents. This fifth sequence was included in the CAFFT because anxious apprehension about the possibility of the airplane crashing is hypothesized to be a key component to many flight phobics' fear (Howard, Murphy, and Clarke, 1993; Van Gerwen, Spinhoven, Diekstra, and Van Dyck, 1997; Wilhelm and Roth, 1997). Exposure to this sequence does not seek to eliminate the instinctual and adaptive fear response to an actual plane crash, but to reduce the extreme anxiety that some flight phobic patients experience when they just think of the possibility of crashing or when they see a plane crash on the TV. CAFFT configures automatically the patients fear hierarchy based on his or her answers on the Fear of Flying Questionnaire (Bornas *et al.*, 1999), integrated into the program. Each item is associated with one of the five exposure sequences. The CAFFT calculates the mean score for each stage of flight and then orders the presentation of stages from the one with the lowest score to the one with the highest score. After being presented with all the photos in a sequence, the patient rates his or her anxiety on a 1-9 point Likert scale. The program repeats the sequence until the patient rates his anxiety as a 1 or a 2. Once the patient has habituated, the program advances to the next sequence in the patient's fear hierarchy. The patient completes therapy after he has habituated to all stages of flight.