

Self-help treatment for fear of flying

Abstract

Fear of flying, (FOF) is a persistent fear during or in anticipation of flying. People with aviophobia have a dispositional tendency to use maladaptive strategies, including alcohol abuse and avoidance behavior to cope with their anxiety. Results show that fearful flyers familiar to maladaptive strategies at start of treatment are less likely to profit from treatment than their more adaptive counterparts. Technological advancement allows for pre-exposure therapy, adding to the development of adaptive coping strategies. This technology could be implemented as a self-help program for people with FOF, or in order to prevent relapse. This study investigated the effectiveness of a self-help program for FOF. Results suggest that self-help offers a promising outcome and warrants further research on how to implement these e-health related technological developments in treating anxiety.

Keywords: aviophobia, fear, self-help, technological advancement

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Introduction

Although researchers use different definitions of aviophobia, scientific publications in Northern American and Western European countries show an estimated percentage of 10 to 40 % of aviophobia prevalence. Fear of Flying (FOF) ranks among the top ten of all fears and phobias in the adult population. The lifetime prevalence rate for a specific phobia is high and might even be underreported for a specific phobia like FOF. Lifetime prevalence of FOF in a sample of the Dutch population was 9.6%.¹ FOF causes serious interference with work and other social activities and daily life.^{1,2} Aviophobia is a heterogeneous phenomenon with large individual differences in the onset and acquisition of the phobia, severity of symptoms and above all comorbidity with other phobias and other anxiety disorders.³ People suffering from aviophobia use different strategies to cope with their anxiety.

Even though 70 to 98% of people with FOF can be treated successfully,⁴ professional help is sought by only 41%, and medication is used by 30%.¹ Therapists working in this field know that most anxiolytics like benzodiazepines are known to impair fear extinction and should as much as possible be banned from the therapeutic process.^{5,6} Benzodiazepines provide short-term relief but significantly diminish the effects of treatment for anxiety and hinder long-term effects of extinction.⁷ Alcohol abuse and the use of medication are forms of avoidance behavior and thus examples of maladaptive strategies.⁸ Increase in the use of adaptive coping strategies, and more importantly, a decrease in the use of maladaptive coping strategies during therapy were indicative of less long-term relapse of flight anxiety and more flights flown within three years after treatment. Recent results show that people seeking help for fear of flying and familiar to maladaptive strategies at start of treatment are less likely to profit from treatment than their more adaptive counterparts.⁹

Over the past 30 years, a number of effective treatments have been developed. Both individual and group treatment is offered. Components of the treatment programs are: information about aviation and anxiety, relaxation, cognitive restructuring, in-vitro training on the ground with planes or a simulator, and a test flight.⁴ Cognitive behavioral group therapy (CBT) with these components has been found to be an effective treatment of FOF.¹⁰ This result was supported by Kim et al.,¹¹ who found that the individuals who completed CBT-treatment were more likely to report on their application of the skills taught in the treatment than those who had not received treatment.

The self-reported use of skills among previously treated individuals was associated with lower levels of flight anxiety. In-vivo exposure is clearly the most important aspect in the treatment of aviophobia. Nevertheless, ancillary therapies could effectively optimize exposure-based interventions and will ultimately result in better short-term and long-term treatment outcomes.¹² Pre-exposure strategies designed to increase tolerance of fear may help to reduce avoidance behavior and may promote extended confrontation with the feared object or situation during exposure. Therefore, it is helpful to avoid maladaptive strategies like avoidance, alcohol and medication.

Emerging techniques allow for pre-exposure therapy at home, with minimal therapist interaction. These technologies can be supplied by interactive online modules and Smartphone assisted guidance.^{13,14} A specialized treatment facility in the Netherlands developed a smartphone Flight App with functionalities that diminish pre-flight distress and reduce avoidance tendencies (Fear of Flying App; <https://itunes.apple.com/nl/app/fear-of-flying-app/id501475441>). The app is available in several languages and has been downloaded over 20,000 times. Hartanto et al.,¹⁵ developed a new home-based VRET system that could be used as a pre-in-vivo exposure aid. The system includes a manual that guides patients through various steps of therapy. Therapists can monitor progress remotely and can amend their treatment plan. These technological developments allow for pre-exposure therapy, adding to the development of adaptive coping strategies instead of avoidance behavior, the use of alcohol or medication. A mild form of FOF could be treated with self-help of which there are many types available.¹⁶ Self-help treatments have the advantage of low cost and easy access for the target group.¹⁷ However, controlled studies that evaluate self-help treatment programs for FOF are scarce. A self-help treatment package-containing a two-hour DVD, a book that supports the topics covered in the DVD and a pocket book in which the major points are summarized and that can be carried on to the plane-has been developed by the VALK Foundation, an outpatient clinic specializing in the treatment of FOF. As an example of self-help this study aims to analyze the effectiveness of the self-help-DVD on FOF.

The self-help-DVD consists of a summary of a two-day group treatment. It includes information about flying, cognitive restructuring, modelling and different coping strategies. In the video, three individuals with different types of flying phobia are followed during treatment. Information is provided about aviation: take-off, landing, turbulence, the different noises an airplane makes, and flight safety.

This information is believed to challenge catastrophic interpretations of normal flight events. Patients in the two-day treatment program reported that this information and the test-flight were the most useful elements in overcoming their FOF.¹⁰ Even though the DVD includes the same components as the normal two-day group program; it differs on four major aspects:

- (a) It is much shorter—two hours instead of two days.
- (b) There is no personal therapist to guide the flying phobic's.
- (c) The focus is on general rather than personal irrational beliefs.
- (d) There is no actual therapeutic flight. Cognitive restructuring is present in the program but the impact may not be as large as that of the two-day program.

Therefore it could be considered useful for those with a milder form of FOF or it may fit in a staggered care model of treatment. Visually accurate images and soundscapes have been used in previous studies to increase the reality of the exposure to flight situations. Ranging from the projection of slides of flight situations,^{18,19} computer-assisted treatment programs with sounds and images of the feared stimuli in a hierarchically structured way,¹⁸ to virtual reality exposure (VRE). The latter form of treatment is technologically the most advanced. Computer rendered graphics, visual display, body tracking devices and sensory input devices are used to create a virtual environment in which perception and action are integrated.²⁰ All these forms of exposure have been found to be effective in reducing FOF.^{18,19,21,22} In the present study it was hypothesized that the individuals who had seen the self-help-DVD would show a reduction in flight anxiety on all self-report measures compared to the control group.^{5,11,23–27} It was also hypothesized that the individuals could work with this self-help program as an alternative to maladaptive coping strategies like avoidance, alcohol and medication.

Methods

Participants

Participants in this study were recruited through a radio broadcast on FOF. A total of 640 individuals applied by completing an internet form and a screening questionnaire. Only participants aged 21 to 50 were included. Exclusion criteria were previous treatment, panic attacks and trauma. The inclusion criteria were met by 421 individuals, of whom 200 were randomly selected and invited by e-mail to participate. Participants were required to confirm availability and to certify they had no history of psychiatric disorders. Date of the last flight, duration of FOF and experiences during flight were required for the potential participants. The acquisition continued until the number of 140 participants was reached. Participants were randomly assigned either to the experimental or to the control group. The 219 individuals that did not qualify for the screening criteria or appeared to be redundant were informed by e-mail. The target was 140 persons, 70 individuals for each group. For each condition 70 persons were invited, but not all showed up. The experiment was conducted at Aviodrome (National Aviation Theme Park, Lelystad, The Netherlands). The experimental group, consisting of 59 individuals, completed the total self-help program in an out-of-service Boeing 747 that is exhibited as an artefact in the theme park. The control group, consisting of 66 individuals, completed the treatment in a neutral film theatre at Aviodrome.

Both groups first gave their informed consent in writing and completed the pre-test questionnaires. These included questionnaires

about demographic characteristics, flight history, willingness to embark on a flight, and three questionnaires assessing anxiety related to flying. Next, the experimental group watched the self-help DVD while the control group watched a two-hour motion picture unrelated to FOF. After completing the self-help motion picture both groups were asked once more about their willingness to embark on a plane—a commercial jet airplane and a single-engine plane—and completed the FOF questionnaires. Finally, the self-help DVD and corresponding questionnaires were offered a third time to the control group. Results of the latter intervention and its effects are not reported in this study, but were used to examine possible effects of environmental clues as well as to determine the clinical significance of watching the DVD.

Measures

The Visual Analogue Flight Anxiety Scale (VAFAS),²⁸ is a one-tailed visual analogue scale on which participants are asked to indicate the extent to which they are anxious about flying. The scale ranges from 1 (no flight anxiety) to 10 (terrified). The Flight Anxiety Situations questionnaire (FAS)²⁹ consists of 32 items that are rated on a five-point Likert scale. The answering format ranges from 1 (no anxiety) to 5 (overwhelming anxiety). The questionnaire covers anxiety related to flying in different flight or flight-related situations. The FAS consists of three subscales:

- a. An anticipatory flight anxiety scale, containing 14 items referring to anxiety experienced when anticipating a flight.
- b. An in-flight anxiety scale, which consist of 11 items pertaining to anxiety experienced during a flight.
- c. A generalized flight anxiety scale, containing 7 items that refer to anxiety experienced in connection with airplanes in general, regardless of personal involvement in a flight situation.

The subscales of the FAS have a good to excellent internal consistency, alphas ranging from .85 to .96.^{28,30} Only the sum scale was used. The Flight Anxiety Modality questionnaire (FAM)²⁹ has 23 items that measure symptoms of anxiety or anticipatory anxiety in flight situations. The FAM has a five-point Likert-type answering format, ranging from 1 (not at all) to 5 (very intense). This questionnaire covers two modalities in which anxiety in flight situations can be expressed, viz.

- (a) The 13-item somatic modality related to physical symptoms.
- (b) The 10-item cognitive modality pertaining to the presence of distressing cognitions.

In this study the 23-item questionnaire is used, which is identical to the 18-item FAM with extra items to determine whether someone experiences panic attacks. The internal consistency of the 18-item FAM, on which the 23-item FAM is based, was good (both subscales alpha of .88.^{28,30} Only the sum scale was used.

Data-analysis

To test our hypothesis that the self-help-DVD would reduce anxiety rates significantly more than a neutral motion picture, a 2x2 repeated measures MANOVA was conducted with condition (experimental versus control) as the Between Subjects factor, Time (pre-, versus post-treatment) as the Within Subjects factor and scores on the VAFAS, FAS and FAM as the dependent variables. In order to test the practical significance of watching the DVD and the neutral film, the effect sizes (ES) were calculated with Cohen's.³¹ Clinical significance was assessed according to the criteria formulated by

Jacobsen & Truax.³² The first criterion is the Reliable Change Index (RCI), which classifies participants whose change is large enough to be reliable. When RCI is >1.96 there is a positive response.³² The RCI was computed for the FAS (1.05) and FAM (0.70). The test-retest correlation co-efficient required for computing the RCIs were obtained from Van Gerwen²⁸ and Busscher³³. The second criterion stipulates that the change has moved the individual outside the range of the dysfunctional population. In this study this was operationalized as reaching scores under the cut-off scores for FAS (56) and FAM (25).³⁰ Finally, the clinical significant change was calculated as the percentage of participants with both a reliable change and an anxiety level under the cut-off score. The influence of environmental cues (e.g. exposure to a Boeing 747 while working through the self-help program) was analyzed by repeated-measures MANOVA. Finally, potential changes in willingness to embark either on a commercial airliner or on a single-engine plane was analyzed by The McNemar test. Statistical procedures were completed by SPSS 16.0.1 for Windows; $p < .05$ was considered significant for all statistical calculations.

Results

Preliminary results

A total of 125 people participated in this study. First, continuous independent variables were screened for normality. Number of flights

and number of weeks since last flight appeared to be positively skewed. Neither square root nor log transformations improved skewedness of these variables. Hence the corresponding raw scores of the groups were compared. The VAFAS-outcomes were negatively skewed. Logarithmic transformation improved its normality considerably and was included in the analyses. Table 1 provides an overview of untransformed outcome data. No significant differences were found between the two groups with regard to sociodemographic characteristics, flight history, number of weeks since the last flight, or number of one-way flights ($p > .05$). Table 1 presents an overview of the mean scores, standard deviations and test statistics of the sociodemographic variables and the variables pertaining to flying behavior. Outcomes for both conditions on the VAFAS [$t(123)=0.36$, $p=.72$], the FAS [$t(123)=0.74$, $p=.46$], or the FAM [$t(123)=-0.60$, $p=.96$] were non-significant. However, statistically relevant differences in willingness to embark on a private plane [$\chi^2(1)=4.32$, $p=.038$] or an airliner [$\chi^2(1)=4.52$, $p=.034$] were found for the experimental condition. More participants reported willingness to embark on either sort of plane than participants in the control group. Repeated measures MANOVA showed no significant main effect of Environment ($\Lambda=.98$, $F(1, 123)=0.732$, $p > .50$), reflecting no differences between the experimental group and the control group on all measures of flight anxiety (Table 1).

Table 1 Socio-demographic characteristics and flight information of the experimental and control condition

	Experimental condition	Control condition	Total	Test statistics
N	59	66	125	
Gender				$\chi^2(1) = 0.03, P = .86$
Females	36 (61%)	39 (59.1%)	75 (60%)	
Males	23 (39%)	27 (40.9%)	50 (40%)	
Age (M, SD)	34.27 (7.83)	35.2 (8.6)	34.74 (8.23)	$t(123) = -0.60, P = .55$
Educational level	(3 missing)			$\chi^2(2) = 4.96; P = .084$
Low <= 6 years	5 (8.5%)	2 (3%)	20 (16.4%)	
Middle = 7 – 10 years	20 (33.9%)	39 (59.1%)	46 (36.8%)	
High >= 11 years	31 (52.5%)	25 (37.9%)	56 (44.8%)	
Flight history				$\chi^2(1) = 2.07, P = .15$
Never flown	5 (8.5%)	11 (16.7%)	16 (12.8%)	
Ever flown	54 (91.5%)	55 (83.3%)	109 (87.2%)	
Weeks since last flight	238 (434.55)	258.84 (384.72)	248.80 (408.38)	$t(107) = -0.23, P = .80$
Number of one-way flights	13.71 (17.32)	11.52 (14.11)	12.58 (15.68)	$t(123) = 0.805, P = .42$

Effectiveness of the self-help program as treatment for fear of flying

The multivariate test of the repeated measures MANOVA showed that there was a significant main effect for time [Wilk's lambda (Λ)=.34, $F(3, 121)=80.58$, $p < .001$], reflecting a change in anxiety for both conditions. As hypothesized there was also a significant group-by-time interaction effect (Wilk's $\Lambda=.57$, $F(3, 121)=30.51$, $p < .001$). Univariate tests showed that there were significant main effects of time for the VAFAS [$F(1, 123)=85.54$, $p < .001$], FAS [$F(1, 123)=219.02$,

$p < .001$], and FAM [$F(1, 123)=147.23$, $p < .001$] as well as significant group-by-time interaction effects on the VAFAS [$F(1, 123)=20.54$, $p < .001$], FAS [$F(1, 123)=91.42$, $p < .001$], and FAM [$F(1, 123)=42.51$, $p < .001$]. As can be inferred from Table 2, the significant main effects indicate that the participants improved on all measures of flight anxiety from pre-test to post-test, and the significant interaction effect showed that the experimental group improved more on all measures than the control group. Effect size (ES) for both groups were calculated on all anxiety measures. According to Cohen's³¹ criteria the ESs in the experimental group could be considered large, whereas the

ESs in the control group appeared to be small. Table 2 provides an overview of the mean scores at pre and post measurement for anxiety and corresponding ESs. Summing up, the pre and post mean scores of both groups showed that the decrease in anxiety on all measures was largest in the experimental group (see Table 2 for the descriptive statistics).

Table 2 Mean and standard deviations at pre- and post-test and Effect sizes (ES) of the anxiety measures in both groups.

Measure	Pre-test (M, SD)	Post-test (M, SD)	Effect size (ES)
Experimental group (N = 59)			
VAFAS	8.39 (1.59)	6.89 (1.85)	0.87
FAS	124.03 (20.03)	93.59 (29.05)	1.22
FAM	78.00(16.98)	59.37 (21.71)	0.96
Control group (N = 66)			
VAFAS	8.53(1.22)	7.97 (1.82)	0.36
FAS	121.38 (19.88)	114.83 (23.17)	0.3
FAM	78.18 (19.07)	72.58 (19.37)	0.29

Clinically significant change

Of the 124 participants, 45.9% had a RCI>1.05 on the FAS, and 13% scored below the cut-off of 56. The percentage of participants who met both criteria was 8.2%. On the FAM, 13.1% of participants had a RCI>0.70. None of the participants had a FAM score under the cut-off of 25. This suggests that none of the participants reported clinically significant change to flight anxiety modalities.

Willingness to embark on a flight

Neither the self-help DVD nor the neutral motion picture resulted in significant change with regard to willingness to embark on a single-engine plane. The McNemar test for the experimental group ($N=59$), resulted in $p=.687$ and resulted in $p=1.000$ for the control group ($N=60$). However, the change in willingness to embark on a regular airliner was significant. McNemar test resulted in $p=.003$ for the experimental group ($N=59$). Within the control group ($N=66$) the McNemar test resulted in $p=.125$.

Discussion & conclusion

In this study the effectiveness of a self-help program was investigated in order to reduce FOF by adding adaptive coping strategies and reducing maladaptive coping styles, e.g. avoidance, cognitive avoidance, alcohol, drugs and medication. A total of 125 individuals were randomly assigned to two distinctive experimental conditions. Approximately half of the participants were offered the self-help DVD program. The other participants were offered a neutral motion picture. The self-help DVD program contains information about flying, with visual images and soundscapes, cognitive restructuring, modelling and different coping strategies. Our results suggest that the self-help program offers promising outcomes and warrants further research on how to implement these technological and cost effective developments in treating anxiety related disorders. As hypothesized, the self-help program was more effective in reducing anxiety than the presentation of a neutral motion picture. For the experimental group a decrease in anxiety as measured by the VAFAS, FAS and FAM appeared to be significant Effect sizes (ESs)

on all self-report instruments for the participants in the experimental condition could be considered large, whereas in the control group the ESs were small to medium. The Reliable Change Index from Jacobsen showed for the FAS that about half of the participants showed a clinically reliable change. Less than a tenth had a clinically reliable change which moved them into the improved group. For the FAM, the percentage of reliable change was discouraging (13.1%) and none of the participants moved into the responding group.³² However, in the experimental group the number of participants willing to fly on a regular plane changed significantly, while no such increase was found within the control group. As for willingness to fly in a single-engine plane no differences were found in either of the conditions.

In conclusion it can be said that the self-help DVD was effective in reducing anxiety in people with FOF. However, not all the participants showed a substantial reduction of their FOF curing them of their flight anxiety. It has to be borne in mind that the DVD is only one component of the self-help treatment, suggesting a positive effect on people suffering from mild flight anxiety, which makes it a desirable alternative to medication. Surprisingly it was not only the experimental group that experienced a significant reduction in flight anxiety on the VAFAS, FAS and FAM; the control group who was offered a neutral motion picture showed reductions on anxiety measures as well. A possible explanation for the fear reduction in the control condition could be that the watching of the neutral DVD distracted participants from their fear activated by all the flight-related cues during the study.²³ Besides, the expectations of individuals about their improvement after treatment could have influenced their reported level of anxiety and might have resulted in a self-fulfilling prophecy.²⁷

Hence it could be inferred that through the presentation of the self-help DVD in a Boeing 747 instead of in a neutral environment might have resulted in greater reductions in flight anxiety.^{34,35} However, this was not supported by the results. A possible explanation for the non-significant effect of the Boeing 747 is the comparable rates of fear activation in both groups before the experiment started. All participants had been exposed to flight-related cues (exhibited airplanes and an airport) that may have activated their fear before they were sent to the two different viewing environments (the Boeing 747 versus the movie theatre). Several limitations of this study need to be addressed. As mentioned earlier, the experimental condition and the control condition were not entirely identical, since the treatment DVD was offered to the experimental condition in a Boeing 747, whereas the control group was offered a neutral motion picture in a non-threatening film theatre. Even though statistical analyses showed that the environment did affect treatment outcome, it would be preferable to have offered both study conditions in identical environments. Furthermore, there was also a self-selection bias, since only people who had indicated they were willing to travel to the Aviodrome could participate in the study. Besides, the DVD part of the self-help program is not tailored to the idiosyncratic needs of the individual. Further research is required to investigate the most effective components of the self-help DVD-program.

First, follow-up research is required to investigate the effects of the self-help program over time. Second, it would be relevant to acquire insight into how the different components of the self-help-program, i.e. the DVD, the self-help book and the fear of flying application for smartphones compare to each other over a longer period of time. Third, effectiveness of self-help treatment should be examined for subjects suffering from traumatic experiences and panic attacks,

since they were excluded in the current study. Also, predictors of the effectiveness of treatment should be examined.¹⁰ Fourth, in future research the expectations of individuals regarding their improvement should be accounted for, because these may influence the effectiveness of treatment.²⁷ Finally, future research should examine whether watching the DVD and going through the self-help program a consecutive number of times would be more effective than watching it only once.¹⁹

Self-help tools help to increase fear tolerance and may aid in reducing avoidance behavior and promote extended confrontation with the feared object or situation during exposure. Moreover, these types of interventions are easily accessible. Subjects can undergo the program whenever it suits them best, since the program does not depend on the availability of a therapist.^{36–38} This results in an effective, economically efficient and as well cost-effective type of treatment. The addition of these technological developments, as well as e.g. the Hartanto home-based VRET system to options for treatment, parallels the quest to integrate e-health or blended forms of therapy to what psychotherapy can offer. Most anxiolytics are known to impair fear extinction and should as much as possible be banned from the therapeutic process. Benzodiazepines provide short-term relief but significantly diminish the effects of treatment for anxiety, and hinder long-term effects of extinction. A randomized controlled trial between self-help tools and anxiolytics could prove to be very relevant. To our knowledge this is the first study within the flying anxiety domain that reports on the value of coping strategies for people with FOF and the effect of pre-treatment for clinical change.

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Conflict of interest

The author declares that there is no conflict of interest.

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