

Different Flying Histories in Flying Phobics: Association with Psychopathology and Treatment Outcome

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Introduction: Passengers experiencing fear of flying can threaten the safety of a flight, its passengers, and crew. In the present study we investigated the effect of different flying histories on the nature and treatment of fear of flying and attempted to determine the following: 1) the prevalence of different flying histories in a sample of self-referred flying phobics; 2) the demographic and psychopathologic characteristics of flying phobics differing with respect to flying history; and 3) the predictive value of different flying histories for treatment outcome. **Methods:** Of 2001 self-referred adults who applied for a flying treatment program, 85.6% reported that they had flown before and that their flights had been uneventful; 8.7% had no previous experience with flying; 5.7% had flown before and had experienced an eventful (5.4%) or even a traumatic flight (0.3%). **Results:** Participants who had never flown before reported higher levels of fear of flying (FAS, FAM, VAFAS), agoraphobia (FSS-III), and general anxiety (SCL-90). Moreover, these subjects showed significantly more anxiety reduction following a 1- or 2-d group treatment than the other participants (statistically corrected for any pretreatment differences). **Conclusions:** For participants who had never flown before, anxiety probably primarily reflects more generalized avoidance tendencies and a proneness to over-predict the magnitude and intensity of their fear.

Keywords: fear of flying, flying history, anxiety, prediction of fear.

FEAR OF FLYING is a frequently observed phobia in clinical practice. An estimated 10–40% of the general population of industrialized countries experience some type of fear in response to the air travel process (16, 17). The last International Conference on Fear of Flying (June 2007), hosted by ICAO in Montreal brought together all of the key players involved in fear of flying and its implications for air transport worldwide. Participants at the ICAO meeting assumed that there are considerable empirical data to support the affirmation that anxiety can threaten the safety of a flight, its passengers, and/or crew. Passengers experiencing fear of flying often turn to alcohol or drugs prior to or during a flight, which may exacerbate the condition and provoke unruly behavior. Such behavior can impact the operation of a flight in various ways. For example, On-Time Performance can be influenced when a passenger wants to deplane prior to or following push-back, possibly resulting in a missed slot-time. In all cases, these disruptions are expensive to airlines and disturbing to passengers. However, to date there is no consensus regarding how

fear of flying is acquired and modulated, thus the nature of flight anxiety remains controversial. Howard, Murphy and Clarke (8) indicated that fear of flying is heterogeneous and not a unitary phenomenon, composed of a number of separate fears, such as fear of crashing, heights, confinement, and instability. Important determinants in the manifestation of fear of flying are also fear of loss of control and a high need to have control over a situation (18). Alternatively, fear of flying can be perceived as the effect of generalizing one or more natural environmental phobias, such as fear of heights, falling, storms, water, instability, and so forth (5). In other words, flight anxiety may be the expression of other phobias or even a combination of them.

Assuming that fear of flying is conditioned through the association of an aversive, possibly threatening event that inherently produces fear with a formerly neutral stimulus such as flying, many aversive, possibly threatening external events are possible. Wilhelm and Roth (22) noted that in their small sample of 66 subjects with severe fear of flying most of the subjects mentioned external conditioning experiences: 8% had been involved in an airplane accident, 27% had been involved in an airplane emergency, and 27% had experienced severe turbulence. However, definitive data concerning the recall of external conditioning experiences in a representative group of flight phobics are lacking. A minority of individuals with high levels of fear of flying have never flown before (15), suggesting that their avoidance behavior is mainly the product of an over-prediction of the magnitude and intensity of fear (2). Because they have never flown, their avoidance behavior precludes any opportunity to disconfirm their over-

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prediction of fearful response (14). These disconfirming experiences are necessary for making corrections in the prediction of future experiences and subsequent fear reduction.

The purpose of the present study was to determine: 1) the prevalence of different flying histories in a sample of self-referred flying phobics; 2) the demographic and psychopathology characteristics of flying phobics differing with respect to flying history; and 3) the predictive value of different flying histories for treatment outcome. It was hypothesized that flying phobics without recall of direct external conditioning experiences to flying stimuli would be characterized by higher levels of general anxiety and avoidance, because their anxiety probably primarily reflects more generalized avoidance tendencies and a proneness to over-predict the magnitude and intensity of their fear. There appears to be a relationship between this hypothesis and the nonassociative model that favors a biological etiology reflecting innate reactions to threatening cues in the absence of habituation due to exposure. Further, it was hypothesized that flying phobics without a history of direct classical conditioning to flying stimuli would respond better to a cognitive-behavioral treatment, because their primary avoidance of flying is presumably not directly classically conditioned and probably more based on observational or instructional learning processes. By offering psychological education combined with *in vitro* and *in vivo* exposure, these participants would be forced to skip their avoidance and would be provided with repeated disconfirming experiences, thus reducing their over-prediction of fear and aversive outcomes in future situations.

METHOD

Participants

The data reported in this study were obtained from participants assessed during the period from 2001 until 2006 at VALK Foundation, a facility that specializes in treating flying phobics. This agency is a joint enterprise of the University of Leiden, KLM Royal Dutch Airlines, Transavia and Schiphol Airport Amsterdam.

Participants were referred from various sources, such as health agencies, health professionals, company health programs, airliners, travel agencies, and self-referrals. Various criteria were used to determine participation. Initially, participants had to speak Dutch sufficiently. Exclusion criteria were psychotic symptoms, suicidal behavior or a risk of imminent suicide or homicide, the use of psychotropic drugs, less than a sixth-grade reading level, psychotherapeutic treatment in the previous month, alcohol or drug addiction less than 1 yr before treatment, and professional flying experience.

Before diagnostic assessment, informed consent was obtained. In order to preserve the anonymity of participants, individual identifiers were stripped from the data base and numbers were used for the participants in the group analysis.

In the initial design of the study, the 2001 participants were divided into four subgroups on the basis of their

flying history. Group 1 consisted of those who had never flown (174 individuals; 8.7%); Group 2 consisted of those who had flown on uneventful flights, *i.e.*, they had experienced no adverse incidents (e.g., severe turbulence, thunderstorms), or traumatic flights (1712 individuals; 85.6%); Group 3 consisted of those who had experienced an adverse incident, but never a traumatic flight (108 individuals; 5.4%); and Group 4 contained people who had experienced a traumatic flight (7 individuals; 0.3%). Because of the small size of the fourth group the third and fourth groups were combined to form a new Group 3: those who had experienced an eventful or traumatic flight. To minimize the chance that our model would be unstable, we downsized the largest group (Group 2), taking a representative random sample of 200 participants, which was almost equal to the next largest group. Consequently, the data reported in this study are based on the following three groups: 1) people who had never flown before, 174 individuals (35.6%); 2) people who had flown before, but didn't experience any adverse incidents, or traumatic flights, 200 individuals (40.9%); and 3) people who had experienced an eventful or traumatic flight, 115 individuals (23.5%).

Of the 489 participants, 237 were women (48.5%) and 252 were men (51.5%). The average age of participants was 40.7 yr (SD = 11.8) ranging from 12 to 75 yr. Demographic data showed that participants' education level was relatively high: 45.4% received higher education, 11.5% upper secondary vocational education, and 29.2% had elementary school education with lower vocational training, while 10% had attended only elementary school. In terms of avoidance behavior, most of the participants had flown before (64.4%). Of these participants, about 50% had less than 10 one-way flights. The mean time that had elapsed since their last flight was more than 30 mo.

Of the 489 participants analyzed at pretreatment, 376 (76.9%) started the 1-d or 2-d group treatment program (19). Reasons for not entering group treatment included: not starting treatment at all ($N = 25$); receiving individual treatment ($N = 72$); or receiving treatment for other problems ($N = 16$). Complete pretest and posttest data for the three outcome measurements of flight anxiety were available for 66.7% of participants. Follow-up data were not available for the remainder because the participants either did not respond to repeated requests to return their follow-up measurements by mail ($N = 114$; 30.3%) or they were still in treatment ($N = 11$; 2.9%). No significant association between severity of flight anxiety, flying history, demographic and psychopathology variables, and availability of follow-up assessment was found.

Procedure

During the diagnostic assessment phase, information was obtained about main phobic complaints, other than fear of flying, as well as information about the severity of the phobic symptoms (experience of panic attacks and other psychological and physical complaints). The therapists were experienced clinical psychologists with

at least 5 yr of experience working with fear of flying patients.

The flying treatment program of VALK Foundation consists of a 1-d Behavioral group treatment (12 h), or a 2-d Cognitive Behavioral group treatment (20 h). The components of these two group treatments are psychological education, instructions on preparation for a flight, ranking of coping skills, imaginary flight, bus ride to airport, stationary plane visit in hangar, two simulator flights, and a guided commercial return flight. The 2-d group treatment also includes interventions directed at cognitive restructuring of anxiety provoking thoughts (19).

Measurements

The *Flight Anxiety Situations Questionnaire-FAS* (21) is a 32-item self-report inventory with a five-point Likert-type answering format, ranging from 1 = "no anxiety" to 5 = "overwhelming anxiety". The questionnaire assesses anxiety related to flying experienced in different flight or flight-related situations, and consists of three subscales: a) an anticipatory flight anxiety scale, containing 14 items that pertain to anxiety experienced when anticipating a flight; b) an in-flight anxiety scale, containing 11 items pertaining to anxiety experienced during a flight; and c) a generalized flight anxiety scale, containing 7 items referring to anxiety experienced in connection with airplanes in general, regardless of personal involvement in a flight situation. The internal consistency of the subscales of the FAS in the present study was good to excellent, ranging from 0.88 to 0.97.

The *Flight Anxiety Modality Questionnaire-FAM* (21) is an 18-item questionnaire measuring the symptoms of anxiety or anticipatory anxiety in flight situations. Each symptom is rated on a Likert-type scale ranging from 1 = "not at all" to 5 = "very intensely". The FAM measures the following modalities in which anxiety in flight situations is expressed: a) Somatic modality, pertaining to physical symptoms; and b) Cognitive modality, related to the presence of distressing cognitions. The internal consistency of the subscales of the FAM in the present study was good (both subscales 0.89).

It is worth mentioning that for those participants who had never flown, questions from the FAS concerning in-flight anxiety and from the FAM concerning the symptoms of anxiety in flight situations were asked hypothetically. Scores for this group of participants should be regarded as predictions of fear during a hypothetical flight.

The *Visual Analogue Flight Anxiety Scale (VAFAS)* asks the participants to indicate the extent to which she or he was anxious about flying on a one-tailed visual analog scale, ranging from 0 = "No flight anxiety" to 10 = "Terrified".

The Dutch version (3) of the *Fear Survey Schedule-third revision-FSS-III* (23) is a 76-item questionnaire that aims to measure the severity of 5 types of phobias: social phobia, agoraphobia, fear of disease/death/injury, fear of

sex and aggression, and fear of living organisms. The internal consistency of the subscales of the FSS-III in the present study was satisfactory to good, ranging from 0.78 to 0.90.

The Dutch version (4) of the *Symptom Check List-90-SCL-90* (7) is a 90-item multidimensional self-report questionnaire which measures the level of several kinds of psychopathology using a 5-point scale. We only used the subscale "Anxiety" in the present study in order to get a measure for the general level of anxious symptoms (the reliability of this subscale was good with a Cronbach's alpha of 0.87).

Data Analysis- Statistical Procedures

ANOVA and Chi square were used to analyze differences in demographic and psychopathology variables between groups with different flying histories. Differences in treatment outcome between these groups were investigated with ANOVA of residualized gain scores on measures for fear of flying. Significant main effects were followed up by Tukey's HSD post hoc contrasts. Due to the significant deviations from normality in all the subscales of the FSS-III and SCL-90, square root transformations were used in the statistical analyses. However, raw scores are reported in the tables and text.

The Statistical Package for Social Sciences (SPSS) 13.0 was used for the data analysis. P-values less than 0.05 were deemed statistically significant.

RESULTS

Relationship of Flying History with Demographic and Psychopathology Variables

Chi square tests and analyses of variance were carried out to test between group differences in demographic and fear of flying history variables (**Table I**). A significant relationship was found between the flying history and gender, education level, as well as for age. The relationship between flying history and the level of attention flying phobics pay to flying events presented by the media, the fact that people in their circle of acquaintances had experienced an accident, the fact that people in their direct environment were afraid of flying, and how frequently their relatives and friends fly were also significant factors. The direction of the group differences in the demographic variables is presented in Table I.

Analysis of variance of FAS, FAM, VAFAS, FSS-III, and SCL-90 scores revealed significant between group differences with respect to most of the subscales (**Table II**). It was observed that, on average, participants who had never flown manifested higher levels of fear of flying [i.e., anticipatory anxiety (FAS), somatic anxiety (FAM), and fear of flying in general (VAFAS)], comorbid phobic fears [i.e., agoraphobia (FSS-III)], and general anxiety symptoms (SCL-90) than participants who had flown before. Participants who had flown uneventfully manifested higher levels of anticipatory anxiety (FAS), agoraphobia (FSS-III), and general anxiety (SCL-90) than participants who had flown before and recalled negative adverse or traumatic events.

TABLE I. GROUP* DIFFERENCES IN VARIABLES ASSESSING SOCIO-DEMOGRAPHIC CHARACTERISTICS.

	Group 1	Group 2	Group 3	Test Statistics	Contrasts
Gender					
Men	102 (58.6%)	90 (45%)	60 (52.2%)		1 > 2 > 3
Women	72 (41.4%)	110 (55%)	55 (47.8%)		2 > 1 > 3
Total	174 (35.6%)	200 (40.9%)	115 (23.5%)	$\chi^2 = 6.9; P = 0.031$	2 > 1 > 3
Age					
Men	43.58 (13.4)	40.80 (10.2)	38.97 (9.4)	$t = 3.3; P = 0.038$	1 = 2 > 3
Women	43.83 (13.6)	38.67 (11.2)	37.62 (10.9)	$t = 5.5; P = 0.005$	2 = 3 < 1
Total	43.63 (13.4)	39.63 (10.8)	38.32 (10.1)	$t = 8.9; P = 0.000$	2 = 3 < 1
Education					
Higher	73 (44%)	87 (45.8%)	52 (45.7%)	$\chi^2 = 41.6; P = 0.000$	2 > 1 > 3
Secondary	15 (9%)	32 (16.9%)	9 (7.9%)		2 > 1 > 3
Elementary	49 (29.5%)	24 (12.6%)	42 (36.8%)		2 > 1 > 3
Lower	29 (17.4%)	9 (4.7%)	11 (9.6%)		1 > 3 > 2
Attention to Media					
Yes	51 (38.1%)	82 (52.6%)	82 (71.9%)	$\chi^2 = 28.4; P = 0.000$	2 = 3 > 1
No	83 (61.9%)	74 (47.4%)	32 (28.1%)		1 > 2 > 3
Surrounding Accident					
Yes	8 (6%)	18 (11.5%)	30 (26.3%)	$\chi^2 = 22.5; P = 0.000$	3 > 2 > 1
No	126 (94%)	138 (88.5%)	84 (73.7%)		2 > 1 > 3
Surrounding Fear of Flying					
Yes	55 (41%)	89 (57.1%)	53 (46.5%)	$\chi^2 = 7.7; P = 0.021$	2 > 1 > 3
No	79 (59%)	67 (42.9%)	61 (53.5%)		1 > 2 > 3
Surrounding Flying Frequency					
Yes	112 (83.6%)	140 (89.7%)	109 (94.8%)	$\chi^2 = 78.1; P = 0.017$	2 > 1 > 3
No	22 (16.4%)	16 (10.3%)	6 (5.2%)		1 > 2 > 3

* Groups based on flying history: 1 = people who had never flown; 2 = people who had flown, uneventful flights; and 3 = people who experienced an eventful or traumatic flight.

Predictive Value of Flying History for the Outcome of Fear of Flying Treatment

As mentioned above, we assessed the change on the FAS, FAM, and VAFAS scales in patients who completed the pretest and posttest measurements (N = 251); the majority of the patients followed the 2-d group treatment (90%). The posttreatment measurements were col-

lected 3 mo after treatment instead of immediately after the therapeutic test flight to avoid euphoric scores, as there is anecdotal evidence that patients score better directly after a test flight due to euphoric moods (21). The effectiveness of the treatment is displayed in Table III.

The dependent variable “flight anxiety” consisted of the residualized gain sum scores on the FAS and FAM

TABLE II. GROUP* DIFFERENCES IN VARIABLES[†] ASSESSING SEVERITY OF FLIGHT ANXIETY, COMORBID FEARS, AND OTHER PSYCHONEUROTIC SYMPTOMS.

	Group 1		Group 2		Group 3		F	Sig. (P < 0.05)	Contrasts
	Mean	SD	Mean	SD	Mean	SD			
FAS									
Anticipatory anxiety	44.5	11.4	41.2	11.2	36.8	12.8	14.6	0.000	1 > 2 > 3
In-flight anxiety	36.4	10.6	35.5	9.9	36.5	8.7	0.5	ns	
Generalized flight anxiety	12.4	5.5	12.5	4.9	12.6	5.4	0.0	ns	
Sum score	104.3	26.9	99.4	24.7	95.7	26.0	3.9	0.020	1 > 3
FAM									
Somatic	30.0	11.6	25.1	10.0	22.3	7.9	21.2	0.000	1 > 2 = 3
Cognitive	21.6	8.0	24.5	7.5	25.4	6.7	11.0	0.000	2 = 3 > 1
VAFAS	8.3	1.6	8.0	1.6	7.8	1.6	4.4	0.013	1 > 3
FSS-III									
Social phobia	21.9	8.1	22.3	8.5	20.8	6.6	1.3	ns	
Agoraphobia	25.9	7.5	23.7	6.6	21.1	5.3	18.1	0.000	1 > 2 > 3
Fear of illness and death	21.1	7.4	21.5	7.9	20.5	7.2	0.5	ns	
Fear of sex and aggression	11.1	13.8	11.1	3.1	10.9	2.8	0.1	ns	
Fear of living organisms	9.0	3.5	9.7	3.8	9.3	3.4	1.4	ns	
Sum score	126.9	33.0	126.6	32.9	119.4	26.9	2.3	ns	
SCL-90									
Fear	17.5	6.5	17.5	6.7	15.1	5.1	6.3	0.003	1 = 2 > 3

* Groups based on flying history: 1 = people who had never flown; 2 = people who had flown, uneventful flights; 3 = people who experienced an eventful or traumatic flight.

[†] FAS = Flight Anxiety Situations Questionnaire; FAM = Flight Anxiety Modality Questionnaire; VAFAS = Visual Analogue Flight Anxiety Scale; FSS-III = Fear Survey Schedule-third revision; SCL-90 = Symptom Check List-90.

TABLE III. EFFECTIVENESS OF TREATMENT.*

	Group 1		Group 2		Group 3	
	Pretreatment Mean (SD)	Posttreatment Mean (SD)	Pretreatment Mean (SD)	Posttreatment Mean (SD)	Pretreatment Mean (SD)	Posttreatment Mean (SD)
FAS[†]						
Anticipatory anxiety	44.8 (11.3)	20.1 (7.9)	42.9 (9.6)	22.3 (9.1)	38.3 (12.0)	20.4 (7.1)
In-flight anxiety	36.0 (10.1)	14.7 (5.1)	36.8 (8.5)	17.6 (7.7)	37.5 (7.4)	17.9 (6.0)
Generalized flight anxiety	12.2 (5.4)	8.2 (2.1)	12.4 (5.0)	8.5 (2.8)	13.0 (5.3)	8.5 (1.9)
Sum score	103.9 (26.1)	47.2 (14.9)	102.7 (21.8)	53.7 (20.1)	98.9 (23.4)	51.8 (15.5)
FAM						
Somatic complaints	29.2 (10.7)	14.6 (4.3)	25.3 (10.1)	15.1 (5.3)	22.8 (7.3)	14.2 (3.7)
Cognitive complaints	22.0 (7.4)	9.8 (3.7)	24.7 (7.1)	11.1 (4.5)	26.3 (6.1)	11.8 (4.6)
VAFAS	8.4 (1.3)	1.8 (1.6)	8.2 (1.5)	2.7 (2.1)	7.9 (1.3)	2.7 (1.6)

* The suitability of data for factor analysis was assessed: the Kaiser-Meyer-Olkin value was 0.665 (exceeding the recommended value of 0.6) and the Bartlett's Test of Sphericity reached statistical significance ($P < 0.001$), supporting the factorability of the correlation matrix. PCA revealed the presence of one component with eigenvalue exceeding 1, explaining 67.86% of the variance. The contribution of the second principal component to the variance was 20.07%. Inspection of the screen plot revealed a clear break after the second component. Using Cattell's screen test, one component for further investigation was retained.

[†] FAS = Flight Anxiety Situations Questionnaire; FAM = Flight Anxiety Modality Questionnaire; VAFAS = Visual Analogue Flight Anxiety Scale.

questionnaires and on the VAFAS scale. Because these outcome measurements proved to be highly correlated ($r = 0.437$ to $r = 0.636$), residualized gain sum scores on the FAS and FAM and on the VAFAS scale were subjected to principal components analysis (PCA) in order to create a composite outcome measurement. We created a new outcome variable, residualized flight anxiety, by summing the three residualized gain scores.

A one-way between groups analysis of variance was performed to explore the impact of flying history on treatment outcome, as measured by the FAS, FAM questionnaires, and the VAFAS scale. There was a statistically significant difference at the $P < 0.001$ level in the scores of the composite measurements [$F(2, 247) = 9.029$, $P < 0.001$]. In particular, it was found that participants who had never flown differed significantly from participants from the other two groups in their response to treatment. Post hoc comparisons using Tukey's HSD test indicated that the mean score of the first group ($M = 0.85$, $SD = 2.38$) was significantly different from those of participants who had flown before uneventfully ($M = -0.35$, $SD = 2.55$) and participants who reported adverse events while flying ($M = -0.66$, $SD = 2.10$). The last two groups did not differ significantly from each other. This means that participants who had never flown before improved more with regard to flight anxiety after treatment than participants from the other two groups.

DISCUSSION

This study investigated the effect of different flying histories on the nature and treatment of fear of flying in clinical practice. The vast majority of flying phobics in the present study were people who had flown before and reported that their flights had been uneventful. People who had no experience with flying, as well as people who had flown before and experienced an eventful or even a traumatic flight were much fewer in numbers, but still comprised a substantial percentage of flying phobics. These data are very divergent from those reported by Wilhelm and Roth (22), who found that

most of the 66 subjects with severe fear of flying had experienced external conditioning. It is likely that the present sample of 2001 persons seeking help for their fear of flying from a specialized treatment facility constitutes a more representative sample. Our data suggest that traumatic conditioning by external aversive events probably constitutes a less prevalent "associative-conditioning" pathway of acquiring fear of flying than previously assumed. Most of those with fear of flying had either flown before without reporting any external aversive events or had never even flown before. Although there is no direct conditioning to flying stimuli for those who had no experience with flying, the subjects comprising this group could have been conditioned to stimuli associated with flying (e.g., heights), could have acquired fear of flying through observational conditioning and instructional learning (13), or could have obtained their fear nonassociatively (12).

Study results were partly in line with the expectation that flying phobics without recall of direct external conditioning experiences to flying stimuli could be characterized by higher levels of anxiety and avoidance, because their fear of flying probably reflects more generalized avoidance tendencies and a proneness to over-predict the magnitude and intensity of their fear. Individuals who had never flown before were indeed characterized by high scores for agoraphobia and general anxiety and also manifested the highest levels of anticipatory flight anxiety and flight anxiety in general.

In addition, some data were collected on verbal and media information on fear of flying, which suggested that indirect associative pathways may be involved in the acquisition of fear of flying. Our findings are consistent with the study by Kendler and colleagues (10), who found support for a strong social learning component in the etiology of situational phobias, including fear of flying. Consequently, a possible explanation could be that some people are particularly prone to develop fear of flying by a process of direct conditioning, while other individuals with fear of flying are more susceptible to

fears that are socially transmitted by observational/vicarious conditioning or by verbal/instructional learning especially when they manifest higher levels of general anxiety and agoraphobic avoidance.

Treatment outcome showed that fear of flying is a well treatable phobia, since the majority of the participants in the treatment program improved regardless of their flying history. Notwithstanding this overall positive treatment outcome, participants who had never flown before profited relatively more from treatment (also after correcting for any pretreatment differences in severity of fear of flying). A possible explanation for this finding could be that because of their primary avoidance these participants never had the opportunity to critically examine the tenability of their over-predictions of fear. A treatment program incorporating education, cognitive-restructuring, and exposure is very likely to be effective in disconfirming their over-prediction of fear fueling their excessive avoidance behavior (11). Treatment was less effective for those who had experienced an eventful or even a traumatic flight, probably due to traumatic direct associative-learning experiences to flying stimuli. In these cases where the origins of fear of flying are probably the result of traumatic associative-conditioning processes, the alteration of the meaning of the connection between the phobic stimulus and the threatening consequence may be harder to realize and requires more extensive and repeated disconfirming experiences.

The two treatment conditions (1-d Behavioral group treatment and 2-d Cognitive Behavioral group treatment) were shown to be effective in decreasing symptoms, as measured both with standardized questionnaires and by the number of participants actually flying with a commercial airline company after treatment (99%). Moreover, analyses of the rate of improvement during treatment suggested that treatment outcome occurred gradually over the course of therapy. Both treatment conditions led to statistically as well as clinically significant improvement. In both treatment conditions, the effect sizes for improvement on the fear of flying measures and on the self-efficacy measures were large. The effect sizes on the fear of flying and self-efficacy measures were all larger in the 2-d Cognitive Behavioral group treatment than in the 1-d Behavioral group treatment. It was shown that for some people a 1-d Behavioral group treatment is adequate, while for others a 2-d Cognitive Behavioral group treatment is necessary (20).

Among the strong points of this study is the almost equal number of men and women who requested treatment (48.5% women and 51.5% men). Moreover, the design of the study had several positive methodological points. The sample was large, which strengthened the statistical components (6). Well-known assessment instruments with good psychometric properties were used (21). Specifically, the dependent variable, flight anxiety, was assessed with specific symptom-oriented self-report questionnaires (FAS, FAM). The advantage of these particular assessment instruments was that they were more precise and more sensitive to changes in flight anxiety than general anxiety questionnaires. Another

positive point is that a pretest-posttest design was used in order to analyze the predictive value of history of flying.

However, the study had certain limitations. Both dependent and independent variables were measured with self-report questionnaires, which may have caused some bias. The question is whether people have insight into their own learning history, emotional and behavioral problems, and personality traits, and can validly report about them (1,9). This shortcoming may especially apply to the reliability of the retrospective recall of aversive external conditioning events. Although flying itself is a unique and consequential event, the recall of less memorable direct and indirect conditioning events may not have been that reliable. Including reliability checks on recall, structured interviews for the assessment of psychiatric disorders as well as physiological measures for anxiety would have strengthened the research findings. In future studies it may also be worthwhile to include recall of internal conditioning experiences, because a substantial portion of flying phobics do not fear an external aversive event (i.e., an air crash) but negative internal events which can be physical, psychological, or social (22). Another consideration is that at the 3-mo follow-up data for only 66.7% of the participants entering treatment were available, although no evidence for selective drop-out was found. In addition, another possible shortcoming is the representativeness of the group studied. It cannot be determined whether the findings can be generalized to people who are afraid of flying but do not seek help for their actual fear of flying. Finally, the lack of a no-treatment control group or a noncognitive behavioral therapy treatment control group, which could enable us to examine the possibility that in some people a specific phobia such as fear of flying might be neither the result of a traumatic experience or an innate trait, but be triggered by another stressful experience, is also a certain limitation of the study.

As pointed out at the beginning of this study, although fear of flying pertains to a specific situation, it is a complex phenomenon. We hope these findings serve to focus attention on ways to further explore the modifying/mediating influence that a variety of background factors may have on the acquisition and development of fear of flying. Further research is needed to more precisely examine the effect of certain patient characteristics on treatment outcome, which may improve the current treatment programs for fear of flying. A major challenge for future research is to determine whether the findings of our study are representative of the total population of flight phobics, and not just for patients who are self-referred and whether this has a bearing on clinical practice.

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