Subjective and physiological reactivity to flight in people with fear of flying

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Synchronous change in subjective and physiological reactivity during flight as an indicator of treatment outcome for aviophobia: a longitudinal study with 3-year follow-up

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SUPPLEMENTAL MATERIAL

Multiple hierarchical regression analyses were used to test the hypothesis that a higher amount of synchronous change is associated with better treatment outcome. Separate analyses were performed for video-, simulator- and flight-exposure. Predictor variables were the SUD, HR, RSA and PEP changes from first- to second- exposure. The products of the SUD change scores with the physiological change scores were added to the regression models in the second step of the regression analyses. Significance of a two-way interaction in this second step of the regression model would be an indication that synchronous change was related to treatment outcome. For example, a significant interaction between changes in SUD and changes in HR would indicate that synchrony between these two components was associated with treatment outcome. Short-term outcome was operationalized as the flight anxiety score taken directly after the second exposure flight. Long-term outcome was operationalized as the flight anxiety score three years after treatment, and number of flights taken in this three-year period. To compensate for individual baseline differences in the flight anxiety outcome variables these anxiety scores were regressed on the flight anxiety score taken during diagnostic assessment. Throughout all regression analyses we first computed saved standardized residuals by regression of second exposure reactivity scores on first exposure reactivity scores, and subsequently used them as independent variables in the final regression analyses. This way it was not necessary to control for baseline values in an additional first step in the hierarchical regression analysis; this procedure reduced the number of predictor variables while reaching similar results.

Contrary to this hypothesis, the results revealed no significant interaction effect in any condition for none of the three paired variables (SUD/HR, SUD/RSA and SUD/PEP). Main effects for changes in SUD and HR emerged during the flight exposure, and a main effect for changes in HR emerged during the simulator exposure, both for short-term outcome. Participants with less diminution in HR over simulated flights reported less decrease in flight anxiety from beginning to end of therapy than participants with more diminution of HR over the simulated flights. Participants who reported less decrease in distress over real flights reported less decrease in flight anxiety from beginning to end of therapy than participants who reported a larger decrease in distress over real flights, and participants with less diminution in HR over real flights reported less decrease in flight anxiety from beginning to end of therapy than participants with more diminution of HR over both real flights.

Table 1a. Regression analyses of short-term treatment outcome (flight anxiety) on changes over video-exposure in subjective distress (SUD) and changes over video-exposure in physiological measures (HR, RSA and PEP) and their interaction.

	VAFAS Short-term				
	B	SE	t	p	Zero-order correlations
Step 1					
Constant	-.052	.123	-.421	.676	-
SUD changes	-.045	.147	-.307	.760	.095
HR changes	.163	.143	1.143	.258	.114
RSA changes	.214	.152	1.404	.166	.160
PEP changes	-.055	.131	-.421	.675	-.085
Step 2					
Constant	-.133	.143	-.931	.356	-
SUD changes	-.036	.147	-.242	.810	.095
HR changes	.161	.144	1.123	.267	.114
RSA changes	.184	.154	1.196	.237	.160
PEP changes	-.053	.142	-.374	.710	-.085
Interaction SUD-HR	-.140	.132	-1.063	.292	-.167
Interaction SUD-RSA	.199	.139	1.429	.159	.195
Interaction SUD-PEP	-.175	.154	-1.135	.261	-.028

VAFAS = Visual Analogue Flight Anxiety, SUD = Subjective Units of Distress,
HR = Heart Rate, RSA = Respiratory Sinus Arrhythmia, PEP = Pre-Ejection Period.

Table 1b. Regression analyses of short-term treatment outcome (flight anxiety) on changes over simulator-exposure in subjective distress (SUD) and changes over simulator-exposure in physiological measures (HR, RSA and PEP) and their interaction.

	VAFAS Short-term				
	B	SE	t	p	Zero-order correlations
Step 1					
Constant	-.137	.135	-1.1017	.318	-
SUD changes	-.176	.131	-1.345	.189	-.005
HR changes	.745	.149	4.985	< .001	.645
RSA changes	.029	.150	.194	.847	-.118
PEP changes	.158	.109	1.443	.160	.107
Step 2					
Constant	-.169	.164	-1.035	.311	-
SUD changes	-.229	.186	-1.235	.228	-.005
HR changes	.705	.166	4.245	< .001	.645
RSA changes	-.027	.172	-.156	.877	-.118
PEP changes	.175	.126	1.388	.177	.107
Interaction SUD-HR	-.059	.179	-.328	.746	-.101
Interaction SUD-RSA	-.139	.146	-.957	.348	-.124
Interaction SUD-PEP	-.028	.177	-.158	.876	-.126

VAFAS = Visual Analogue Flight Anxiety, SUD = Subjective Units of Distress,
HR = Heart Rate, RSA = Respiratory Sinus Arrhythmia, PEP = Pre-Ejection Period.

Table 1c. Regression analyses of short-term treatment outcome (flight anxiety) on changes over flights in subjective distress (SUD) and changes over flights in physiological measures (HR, RSA and PEP) and their interaction.

	VAFAS Short-term				
	B	SE	t	p	Zero-order correlations
Step 1					
Constant	.10	.144	.070	.944	-
SUD changes	.423	.157	2.699	.011	.303
HR changes	.476	.169	2.813	.008	.309
RSA changes	.252	.153	1.646	.108	-.035
PEP changes	.059	.158	.375	.710	-.074
Step 2					
Constant	-.074	.158	-.469	.642	-
SUD changes	.571	.220	2.597	.014	.303
HR changes	.422	.171	2.460	.019	.309
RSA changes	.252	.163	1.546	.132	-.035
PEP changes	-.006	.170	-.033	.974	-.074
Interaction SUD-HR	-.361	.203	-1.777	.085	-.162
Interaction SUD-RSA	-.083	.173	-.482	.633	-.029
Interaction SUD-PEP	.004	.213	.017	.987	-.164

VAFAS = Visual Analogue Flight Anxiety, SUD = Subjective Units of Distress, HR = Heart Rate, RSA = Respiratory Sinus Arrhythmia, PEP = Pre-Ejection Period.

Table 2a. Regression analyses of long-term treatment outcome (flight anxiety) on changes over video-exposure in subjective distress (SUD) and changes over video-exposure in physiological measures (HR, RSA and PEP) and their interaction.

	VAFAS Long-term				
	B	SE	t	p	Zero-order correlations
Step 1					
Constant	-.083	.121	-.685	.496	-
SUD changes	.020	.133	.147	.884	.039
HR changes	.043	.141	.303	.763	.092
RSA changes	-.019	.158	-.119	.906	-.060
PEP changes	-.077	.123	-.628	.533	-.108
Step 2					
Constant	-.122	.134	-.912	.366	-
SUD changes	-.048	.146	-.330	.742	.039
HR changes	.029	.152	.192	.848	.092
RSA changes	-.117	.167	-.701	.486	-.060
PEP changes	-.084	.129	-.648	.520	-.108
Interaction SUD-HR	-.089	.179	-.500	.619	.040
Interaction SUD-RSA	-.299	.176	-1.695	.096	-.200
Interaction SUD-PEP	-.046	.132	-.350	.728	-.098

VAFAS = Visual Analogue Flight Anxiety, SUD = Subjective Units of Distress, HR = Heart Rate, RSA = Respiratory Sinus Arrhythmia, PEP = Pre-Ejection Period.

Table 2b. Regression analyses of long-term treatment outcome (flight anxiety) on changes over simulator-exposure in subjective distress (SUD) and changes over simulator-exposure in physiological measures (HR, RSA and PEP) and their interaction.

	VAFAS Long-term				
	B	SE	t	p	Zero-order correlations
Step 1					
Constant	.129	.166	.775	.445	-
SUD changes	.285	.212	1.346	.189	.222
HR changes	-.445	.196	-2.276	.031	-.240
RSA changes	-.129	.226	-.571	.572	.041
PEP changes	-.335	.149	-2.255	.032	-.275
Step 2					
Constant	.034	.197	.171	.866	-
SUD changes	.043	.329	.129	.898	.222
HR changes	-.467	.302	-1.543	.136	-.240
RSA changes	-.209	.310	-.673	.507	.041
PEP changes	-.283	.172	-1.648	.112	-.275
Interaction SUD-HR	.032	.521	.062	.951	.331
Interaction SUD-RSA	-.276	.520	-.531	.600	-.274
Interaction SUD-PEP	.154	.340	.452	.655	-.100

VAFAS = Visual Analogue Flight Anxiety, SUD = Subjective Units of Distress, HR = Heart Rate, RSA = Respiratory Sinus Arrhythmia, PEP = Pre-Ejection Period.

Table 2c. Regression analyses of long-term treatment outcome (flight anxiety) on changes over flights in subjective distress (SUD) and changes over flights in physiological measures (HR, RSA and PEP) and their interaction.

	VAFAS Long-term				
	B	SE	t	p	Zero-order correlations
Step 1					
Constant	-.039	.163	-.237	.814	-
SUD changes	.024	.152	.158	.876	.036
HR changes	.068	.185	.369	.715	.119
RSA changes	.003	.193	.017	.987	-.025
PEP changes	-.122	.177	-.691	.495	-.164
Step 2					
Constant	-.089	.174	-.509	.615	-
SUD changes	.098	.201	.487	.631	.036
HR changes	.032	.193	.164	.871	.119
RSA changes	-.008	.243	-.033	.974	-.025
PEP changes	-.175	.189	-.928	.362	-.164
Interaction SUD-HR	-.292	.254	-1.149	.261	-.105
Interaction SUD-RSA	-.063	.241	-.263	.795	-.009
Interaction SUD-PEP	-.148	.167	-.884	.385	-.076

VAFAS = Visual Analogue Flight Anxiety, SUD = Subjective Units of Distress,
HR = Heart Rate, RSA = Respiratory Sinus Arrhythmia, PEP = Pre-Ejection Period.

Table 3a. Regression analyses of long-term treatment outcome (number of flights taken within three years after treatment) on changes over video-exposure in subjective distress (SUD) and changes over video-exposure in physiological measures (HR, RSA and PEP) and their interaction.

	Number of Flights				
	B	SE	t	p	Zero-order correlations
Step 1					
Constant	.052	.128	.408	.685	-
SUD changes	-.146	.151	-.966	.338	-.256
HR changes	-.097	.154	-.628	.533	-.119
RSA changes	-.214	.155	-1.384	.172	-.244
PEP changes	.008	.126	.061	.952	.056
Step 2					
Constant	.079	.148	.533	.597	-
SUD changes	-.133	.154	-.864	.392	-.256
HR changes	-.143	.162	-.887	.379	-.119
RSA changes	-.200	.158	-1.266	.212	-.244
PEP changes	.044	.134	.328	.744	.056
Interaction SUD-HR	-.132	.155	-.857	.396	-.124
Interaction SUD-RSA	.057	.139	.411	.683	.078
Interaction SUD-PEP	.027	.145	.189	.851	.068

SUD = Subjective Units of Distress, HR = Heart Rate, RSA = Respiratory Sinus Arrhythmia, PEP = Pre-Ejection Period.

Table 3b. Regression analyses of long-term treatment outcome (number of flights taken within three years after treatment) on changes over simulator-exposure in subjective distress (SUD) and changes over simulator-exposure in physiological measures (HR, RSA and PEP) and their interaction

	Number of Flights				
	B	SE	t	p	Zero-order correlations
Step 1					
Constant	.181	.202	.900	.377	-
SUD changes	.053	.204	.259	.798	-.001
HR changes	.052	.201	.258	.798	.062
RSA changes	.187	.210	.892	.380	.093
PEP changes	-.234	.159	-1.471	.153	-.255
Step 2					
Constant	.250	.257	.973	.341	-
SUD changes	.037	.286	.129	.899	-.001
HR changes	.028	.220	.126	.901	.062
RSA changes	.256	.253	1.010	.323	.093
PEP changes	-.298	.191	-1.565	.131	-.255
Interaction SUD-HR	-.086	.297	-.289	.775	.105
Interaction SUD-RSA	-.004	.234	-.018	.985	-.118
Interaction SUD-PEP	-.270	.287	-.940	.357	-.099

SUD = Subjective Units of Distress, HR = Heart Rate, RSA = Respiratory Sinus Arrhythmia, PEP = Pre-Ejection Period

Table 3c. Regression analyses of long-term treatment outcome (number of flights taken within three years after treatment) on changes over flights in subjective distress (SUD) and changes over flights in physiological measures (HR, RSA and PEP) and their interaction

	Number of Flights				
	B	SE	t	p	Zero-order correlations
Step 1					
Constant	-.091	.204	-.444	.661	-
SUD changes	-.022	.195	-.113	.911	-.018
HR changes	-.252	.242	-1.042	.306	-.076
RSA changes	-.136	.230	-.592	.559	-.044
PEP changes	-.283	.211	-1.340	.191	-.191
Step 2					
Constant	-.071	.208	-.342	.735	-
SUD changes	-.238	.265	-.900	.736	-.018
HR changes	-.217	.245	-.885	.384	-.076
RSA changes	-.179	.240	-.746	.462	-.044
PEP changes	-.253	.215	-1.181	.248	-.191
Interaction SUD-HR	-.547	.402	-1.362	.185	-.087
Interaction SUD-RSA	-.126	.237	-.532	.599	-.104
Interaction SUD-PEP	-.476	.264	-1.799	.084	-.168

SUD = Subjective Units of Distress, HR = Heart Rate, RSA = Respiratory Sinus Arrhythmia, PEP = Pre-Ejection Period