CHAPTER 7

RESULTS

7.1 INTRODUCTION

This chapter focuses on the reporting, interpretation and discussion of the research results. Factor analysis, structural equivalence, analysis of item bias, reliability and item analysis, scale descriptions, analysis of variance (ANOVA) and multiple analyses of variance (MANOVA) are all reported and interpreted.

7.2 FACTOR ANALYSIS

As previously discussed in Chapter 6, factor analysis is used to determine the latent structure or dimensions of a set of variables. The responses of 713 pilots in two countries were examined with regard to the 72 items of the Attitude Gender Aviation Questionnaire (AGAQ) in order to determine whether the data were suitable for factor analysis. The number of subjects was larger than nine times the number of variables. This complies with Bryant and Yarnold’s (1996:236) subjects-to-variables ratio of 5:1, and Lawley and Maxwell’s significance rule which requires 51 more cases than the number of variables to support chi-square testing.

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett’s test of sphericity are set out in Table 7.1. The two diagnostic tests produced satisfactory results for both countries. The KMO values were 0.8451 and 0.9506 for the United States and South African groups respectively, and can be considered highly satisfactory.

Bartlett's test confirmed ($p<0.001$) that the properties of the correlation matrices for both countries were suitable for factor analysis (Hair *et al.*, 1998; Gorsuch, 1983).

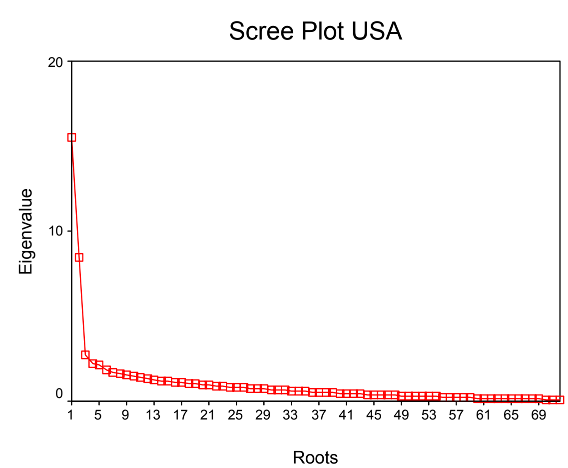
Table 7.1: Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test of sphericity

		United States	South Africa
KMO measure of sampling adequacy		0.8451	0.9506
Bartlett's test of sphericity	Approx. Chi-Square	6940.7347	18749.0705
	df	2556.0000	2556.0000
	Sig.	0.0000	0.0000

p<0.001

In the first round of Exploratory Factor Analysis, the responses of the two samples on the 72 items of the AGAQ were inter-correlated separately and rotated to a simple structure by means of the varimax rotation for each sample separately. (Owing to a lack of space, the inter-correlation matrices are not reproduced here.)

Based on Kaiser's (1961) criterion (eigenvalues larger than unity), 14 factors for the South African data and 19 factors for the United States data were postulated. The 14 factors explained 60.157% of the variance in the factor space of South African data and the 19 factors explained 69.146% of the variance in the factor space of the United States data. The factor analyses yielded more factors in the real test space than was expected. This is probably due to the presence of differentially skew items. However, the difference between the eigenvalues of the first two factors and the rest suggested that there are actually only two significant constructs. The scree plots presented in Figures 7.1 and 7.2 confirm a two-factor solution. According to Cattell's scree test, all factors can be omitted after the one starting the elbow in the downward curve of the eigenvalues.



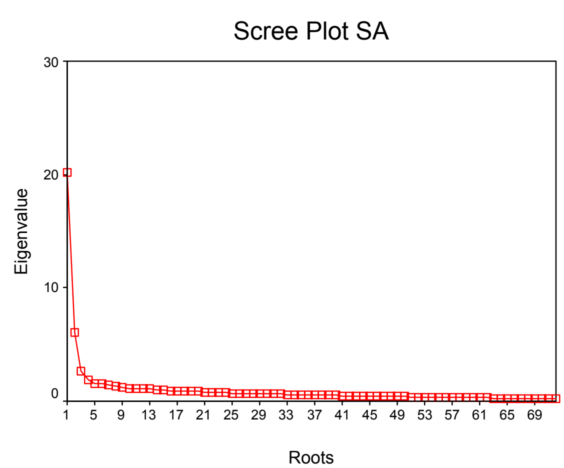


Figure 7.1: Scree plot United States **Figure 7.2: Scree plot South Africa**

Next, the factor matrices that had been obtained were rotated to a simple structure with the aid of a varimax rotation with Kaiser's Normalization. Following this, all items with factor loadings less than 0.40 or which cross loaded on more than one factor with a difference in loading of less than 0.250 were omitted.

In the second round of the Exploratory Factor Analysis, 43 items for the United States and South African AGAQ were subjected to principal axis factor analysis. Accordingly nine factors (United States) and six factors (South Africa) were extracted with eigenvalues greater than one. From an inspection of the eigenvalues and scree plots, only two factors were properly determined for both countries. The eigenvalues of the 43x43 inter-correlation matrices are set out in Table 7.2. The two factors explain up to 43% of the cumulative variance of the data set for the United States group and 44% of the cumulative variance of the data set for the South African group. (The inter-correlation matrices of the 43 items were also considered too large to reproduce here.)

Table 7.2: Total variance explained by the factors of the AGAQ

Initial eigenvalues, United States				Initial eigenvalues South Africa		
Root	Eigenvalue	% of Variance	Cumulative %	Eigenvalue	% of Variance	Cumulative %
1	**12.0783**	**28.0891**	**28.0891**	**13.9540**	**32.4511**	**32.4511**
2	**6.3760**	**14.8280**	**42.9171**	**5.0500**	**11.7442**	**44.1953**
3	1.9291	4.4862	47.4033	1.7085	3.9733	48.1686
4	1.4955	3.4780	50.8813	1.3465	3.1313	51.2999
5	1.4096	3.2781	54.1595	1.0987	2.5551	53.8551
6	1.2764	2.9683	57.1277	1.0385	2.4152	56.2703
7	1.1442	2.6610	59.7887	0.9792	2.2772	58.5474
8	1.0362	2.4097	62.1984	0.9200	2.1395	60.6870
9	1.0208	2.3740	64.5725	0.8792	2.0447	62.7317
10	0.9456	2.1990	66.7715	0.8184	1.9032	64.6349
11	0.8786	2.0433	68.8148	0.7993	1.8589	66.4938
12	0.8058	1.8740	70.6888	0.7484	1.7404	68.2342

13	0.7586	1.7641	72.4530	0.7195	1.6732	69.9074
14	0.7286	1.6945	74.1475	0.6583	1.5308	71.4382
15	0.7042	1.6376	75.7850	0.6512	1.5143	72.9526
16	0.6571	1.5281	77.3131	0.6152	1.4307	74.3833
17	0.6425	1.4943	78.8074	0.6001	1.3956	75.7788
18	0.6370	1.4815	80.2888	0.5903	1.3729	77.1517
19	0.5945	1.3826	81.6714	0.5680	1.3210	78.4727
20	0.5669	1.3184	82.9899	0.5542	1.2888	79.7615
21	0.5421	1.2606	84.2505	0.5413	1.2589	81.0204
22	0.5246	1.2201	85.4706	0.5055	1.1755	82.1959
23	0.5152	1.1982	86.6687	0.4844	1.1265	83.3225
24	0.4754	1.1057	87.7744	0.4756	1.1059	84.4284
25	0.4521	1.0515	88.8259	0.4729	1.0998	85.5282
26	0.4233	0.9845	89.8104	0.4649	1.0811	86.6093
27	0.3994	0.9288	90.7392	0.4570	1.0627	87.6720
28	0.3807	0.8854	91.6246	0.4283	0.9960	88.6680
29	0.3750	0.8721	92.4967	0.4173	0.9705	89.6386
30	0.3501	0.8141	93.3108	0.4094	0.9521	90.5906
31	0.3347	0.7783	94.0891	0.4047	0.9412	91.5318
32	0.3245	0.7547	94.8438	0.3838	0.8927	92.4245
33	0.2885	0.6709	95.5148	0.3780	0.8792	93.3037
34	0.2602	0.6050	96.1198	0.3558	0.8275	94.1312
35	0.2376	0.5527	96.6725	0.3285	0.7639	94.8951
36	0.2259	0.5253	97.1978	0.3229	0.7508	95.6459
37	0.2158	0.5018	97.6996	0.3078	0.7158	96.3617
38	0.2036	0.4736	98.1732	0.2918	0.6785	97.0403
39	0.1945	0.4524	98.6256	0.2840	0.6605	97.7008
40	0.1634	0.3800	99.0056	0.2627	0.6110	98.3117
41	0.1505	0.3501	99.3557	0.2509	0.5835	98.8953
42	0.1484	0.3452	99.7009	0.2415	0.5617	99.4569
43	0.1286	0.2991	100.0000	0.2335	0.5431	100.0000

Subsequently a two-factor solution was requested and 43 items of each sample were rotated to a simple structure by means of the varimax procedure. The rotated factor matrices are set out in Table 7.3 (overleaf).

Table 7.3: Rotated two-factor solution for the United States and South African groups

Item	Description	*United States*		*South Africa*	
		Factor 1	**Factor 2**	**Factor 1**	**Factor 2**
q. 2	Female pilots are more accident-prone than male pilots.	**0.508**	0.096	**0.686**	0.057
q. 6	Male pilots are less prone to incidents than female pilots.	**0.459**	-0.020	**0.666**	0.006
q. 9	Male pilots make fewer mistakes while learning to fly than female pilots.	**0.616**	-0.040	**0.650**	0.002
q. 10	Male pilots have a stronger internal sense of direction than female pilots.	**0.618**	-0.084	**0.635**	-0.127
q. 11	Female pilots often have difficulty making decisions in urgent situations.	**0.726**	-0.025	**0.713**	-0.067
q. 13	Male student learn piloting skills faster than female flight students.	**0.669**	-0.113	**0.670**	-0.155
q. 14	Female pilots tend to pay meticulous attention to detail.	0.128	**0.552**	0.186	**0.527**
q. 17	Women often lack the endurance to complete flight school.	**0.593**	0.135	**0.634**	0.019
q. 18	Male pilots become fatigued less quickly during long flights than female pilots.	**0.581**	-0.038	**0.651**	-0.062
q. 19	The most likely reason for accidents involving women pilots is poor decision-making.	**0.472**	0.136	**0.645**	-0.015
q. 20	On a commercial flight, I feel safer with a male pilot than I do with a female pilot.	**0.589**	0.064	**0.712**	-0.007
q. 21	Female flight students are more cautious than male flight students.	-0.049	**0.698**	-0.014	**0.643**
q. 22	Female pilots become fatigued quicker during stressful flights than male pilots.	**0.733**	-0.083	**0.718**	-0.134
q. 23	Female pilots prefer to have information above the required minimum, more so than male pilots.	-0.085	**0.697**	-0.103	**0.625**
q. 24	Male pilots are less nervous when piloting than female pilots.	**0.658**	-0.247	**0.634**	-0.288
q. 25	Male flight students take greater risks in flying than female flight students.	-0.138	**0.536**	-0.096	**0.624**
q. 26	Male pilots are less likely to make judgment errors in an emergency than female pilots.	**0.594**	-0.028	**0.713**	-0.057
q. 27	Female pilots prefer to have complete resolution to a problem before taking off, more so than male pilots.	0.011	**0.666**	-0.152	**0.640**
q. 30	Male pilots make fewer mistakes when piloting than female pilots.	**0.662**	-0.036	**0.746**	0.047

q. 33	Women tend to learn to fly and preflight 'by the book', more so than men.	-0.097	**0.709**	-0.239	**0.469**
q. 34	Female pilots tend to worry too much about insignificant things when flying.	**0.632**	-0.080	**0.617**	-0.252
q. 35	Female pilots in leadership positions always seem to have the attitude that they have something to prove.	**0.588**	-0.033	**0.510**	-0.037
q. 37	Female flight students tend to experience difficulty in learning to use rudder controls, more so than male flight students.	**0.682**	-0.149	**0.632**	-0.110
q. 38	The most likely reason for accidents in which female pilots are involved is aircraft mishandling.	**0.474**	-0.032	**0.624**	-0.087
q. 41	Male flight students tend to respond better to a 'bounce' than female flight students.	**0.623**	-0.134	**0.561**	-0.275
q. 42	Female pilots are more likely to lose control following a stall than male pilots.	**0.697**	-0.079	**0.722**	-0.096
q. 43	Male pilots tend to be more confident than female pilots.	**0.546**	-0.280	**0.564**	-0.331
q. 45	When learning to fly, female pilots are more safety-oriented than male pilots.	0.151	**0.725**	0.067	**0.742**
q. 46	Male pilots are less likely to lose control when landing or taking off in a crosswind than female pilots.	**0.691**	-0.121	**0.682**	-0.129
q. 47	Female pilots tend to be more successful at crew management than male pilots.	0.030	**0.630**	0.139	**0.500**
q. 49	Male flight students tend to be less fearful of learning stall procedures than female students.	**0.435**	-0.374	**0.498**	-0.387
q. 51	Male pilots tend to be more rational in making decisions than female pilots.	**0.743**	-0.028	**0.714**	-0.135
q. 52	Flight programme standards for the airlines/military have been relaxed in order to increase the number of female pilots.	**0.498**	0.041	**0.571**	0.132
q. 53	Male flight students tend to learn navigational issues faster than female flight students.	**0.604**	-0.230	**0.634**	-0.101
q. 55	Female pilots' decision-making ability is as good in emergency situations as it is in routine flights	**0.519**	0.143	**0.576**	0.082
q. 56	Supervisors of female pilots often let them get away with a little more because they are afraid of being branded sexist.	**0.611**	0.085	**0.526**	0.064
q. 57	Female flight students tend to experience more difficulty in learning radio communication procedures than male flight students.	**0.569**	-0.053	**0.568**	0.016
q. 58	Male pilots are more likely to run out of fuel than female pilots.	-0.026	**0.739**	-0.108	**0.581**
q. 62	Male pilots are more likely to land with the landing gear up than female pilots.	-0.133	**0.658**	-0.157	**0.519**

q. 63	Female pilots often lack the leadership ability required to pilot a multi-crew flight.	**0.499**	0.141	**0.734**	-0.016
q. 67	Male pilots tend to take greater risks than female pilots.	-0.024	**0.743**	-0.104	**0.595**
q. 69	Flight training standards have been relaxed so that it is easier for women to get their 'wings'.	**0.586**	0.165	**0.643**	0.133
q. 70	Female pilots tend to practise more situational awareness than male pilots.	0.059	**0.686**	0.121	**0.478**

Extraction Method: Principal Axis Factoring.

Rotation Method: Varimax with Kaiser Normalization.

Rotation converged in three iterations.

The results of the Principal Axis Factor Analysis performed on the AGAQ indicated little difference in the factor structures for the United States and the South African groups:

- the number of significant factors and the proportion of variance explained are approximately similar for both groups;
- the factor solutions are clear and similar for both groups; and
- the factor loadings seem to be similar for both the United States and the South African groups.

7.3 STRUCTURAL EQUIVALENCE

Next, target (Procrustean) rotation was used to determine the construct equivalence of the two factors of the AGAQ for the different culture groups. The factor loadings for the United States and the South African groups were rotated to one target group. After target rotation had been carried out, factorial agreement was estimated using Tucker's coefficient of agreement (congruence) (Tucker's phi). The Tucker's phi-coefficients for the two culture groups are set out in Table 7.4.

Table 7.4: Construct equivalence of the AGAQ for different culture groups

Factor	Identity coefficient	Proportionality coefficient
F1	0.98	0.99
F2	0.97	0.98

Inspection of Table 7.4 shows that the Tucker's phi-coefficients for the United States and the South African groups were all acceptable (>0.95). Therefore, it can be deduced that the two factors of the AGAQ were equivalent for the two groups. This may be the result of the fact that both groups (United States and South African) operate in Western cultures that use similar technical pilot training. Both countries also communicate and are trained in the English language.

7.4 ANALYSIS OF ITEM BIAS

Univariate analysis was used to calculate the eta square to determine the main and interaction effect sizes of the culture and score levels on the different items of Factor 1 and Factor 2. The aim of the analysis was not to test for cultural difference, but to test whether the item scores were identical for persons from different culture groups with an equal score level (Van de Vijver, 2002:75). The results of the item bias analysis are reported in Tables 7.5 and 7.6 respectively.

Table 7.5: Item bias analysis of Factor 1 of the AGAQ

Item	Tot_SS	Df_g	SS_g	F_g	Eta square_g	Df_i	SS_i	F_i	Eta square_i
Q2	587.408	1	0.437	0.714	0.001	3	3.916	2.131	0.009
Q6	625.622	1	1.360	2.060	0.003	3	8.014	4.046	0.017
Q9	604.381	1	0.816	1.453	0.002	3	1.203	0.714	0.003
Q10	1028.693	1	1.975	2.316	0.003	3	10.739	4.197	0.018
Q11	973.260	1	2.933	3.938	0.006	3	7.777	3.480	0.015
Q13	837.994	1	0.096	0.134	0.000	3	11.321	5.261	0.022
Q17	657.891	1	10.575	17.292	0.024	3	3.166	1.726	0.007
Q18	646.809	1	0.327	0.528	0.001	3	3.476	1.875	0.008
Q19	714.324	1	0.225	0.308	0.000	3	5.656	2.580	0.011
Q20	1142.095	1	14.764	15.669	0.022	3	10.119	3.580	0.015
Q22	721.377	1	0.227	0.398	0.001	3	7.649	4.468	0.019
Q24	851.051	1	0.198	0.280	0.000	3	10.053	4.737	0.020
Q26	688.642	1	0.001	0.002	0.000	3	4.923	2.576	0.011
Q30	598.693	1	0.031	0.053	0.000	3	0.490	0.276	0.001
Q34	897.150	1	20.546	28.822	0.039	3	8.125	3.799	0.016
Q35	1036.313	1	17.973	18.349	0.025	3	2.959	1.007	0.004
Q37	647.100	1	2.677	4.591	0.006	3	2.559	1.462	0.006
Q38	611.546	1	6.366	9.854	0.014	3	2.842	1.466	0.006
Q41	686.156	1	2.380	3.847	0.005	3	2.574	1.387	0.006
Q42	577.736	1	0.852	1.696	0.002	3	4.437	2.946	0.012
Q43	873.493	1	0.827	1.040	0.001	3	25.637	10.750	0.044
Q46	670.876	1	1.895	3.064	0.004	3	5.122	2.760	0.012
Q49	732.121	1	0.504	0.667	0.001	3	20.273	8.953	0.037
Q51	884.059	1	7.370	11.749	0.016	3	7.890	4.193	0.018
Q52	990.458	1	1.016	0.976	0.001	3	3.614	1.158	0.005
Q53	720.556	1	0.027	0.042	0.000	3	12.135	6.284	0.026
Q55	720.819	1	4.413	5.746	0.008	3	3.814	1.655	0.007
Q56	943.596	1	7.813	8.455	0.012	3	1.145	0.413	0.002
Q57	512.452	1	1.299	2.463	0.003	3	1.748	1.105	0.005
Q63	769.861	1	1.403	1.943	0.003	3	7.095	3.276	0.014
Q69	900.864	1	1.540	1.735	0.002	3	4.223	1.586	0.007

Table 7.6: Item bias analysis of Factor 2 of the AGAQ

Item	Tot_SS	Df_g	SS_g	F_g	Eta square_g	Df_i	SS_i	F_i	Eta square_i
Q14	609.515	1	12.209	20.028	0.028	3	4.749	2.597	0.011
Q21	643.770	1	12.226	21.323	0.029	3	5.010	2.912	0.012
Q23	721.437	1	2.837	4.638	0.007	3	3.082	1.680	0.007
Q25	695.191	1	0.693	1.026	0.001	3	0.491	0.242	0.001
Q27	682.824	1	1.243	2.133	0.003	3	2.229	1.276	0.005
Q33	762.163	1	18.921	25.915	0.036	3	15.028	6.861	0.028
Q45	770.433	1	0.026	0.045	0.000	3	0.970	0.561	0.002
Q47	679.189	1	11.907	17.893	0.025	3	3.250	1.628	0.007
Q58	846.729	1	11.077	16.318	0.023	3	1.242	0.610	0.003
Q62	729.367	1	6.336	9.693	0.014	3	0.284	0.145	0.001
Q67	736.774	1	0.749	1.163	0.002	3	1.370	0.709	0.003
Q70	614.704	1	8.104	14.433	0.020	3	2.979	1.768	0.007

Where:

g *= culture*

i *= interaction*

Tot_SS *= correlated total sum of squares*

Df_g *= degrees of freedom for the cultural groups*

SS_g *= summed square of the cultural groups*

F_g *= statistics for cultural groups*

Eta square_g *= partial eta square for the cultural groups*

Df_i *= interaction (levels*culture)*

SS_i *= sum of squares of interaction (levels*culture)*

F_i = *statistical interaction*

Eta square_i *= measures effect size*

Tables 7.5 and 7.6 show no significant eta square values for the items of the two factors of the AGAQ. Therefore, it seems that the means of the two cultural groups for the different score levels do not differ from zero in a systematic way. It is clear that the items of the two factors measured by the AGAQ shows no uniform or non-uniform bias for pilots from different culture groups.

7.5 RELIABILITY AND ITEM ANALYSIS

Based on the results of the factor analysis, the test for construct equivalence and the results of the item bias analysis, it was decided to pool the responses of the United States and the South African groups for each factor separately and to determine the reliability and distributive characteristics of each factor (scale).

Table 7.7: Item analysis of the responses on the AGAQ for the total group: Factor 1

Item	Mean of item	Standard deviation	Skewness	Kurtosis	Item-test correlation	Mean inter-item correlation	Reliability index of item	Alpha if item is deleted
	xg	sg	sk	ku	rg	xir	rg*sg	∝
Q2	4.178	0.906	-1.060	0.749	0.647	0.441	0.587	0.9590
Q6	3.872	0.940	-0.728	0.154	0.605	0.415	0.568	0.9593
Q9	3.805	0.923	-0.471	-0.386	0.662	0.450	0.610	0.9589
Q10	3.271	1.207	-0.070	-1.199	0.672	0.455	0.812	0.9589
Q11	3.460	1.182	-0.250	-1.084	0.743	0.500	0.878	0.9583
Q13	3.442	1.094	-0.175	-1.021	0.687	0.466	0.751	0.9587
Q17	3.892	0.963	-0.702	-0.056	0.663	0.450	0.638	0.9589
Q18	3.686	0.954	-0.355	-0.511	0.656	0.447	0.626	0.9590
Q19	3.655	1.019	-0.357	-0.656	0.598	0.408	0.609	0.9594
Q20	3.542	1.266	-0.405	-1.084	0.720	0.486	0.911	0.9585
Q22	3.438	1.014	-0.190	-0.802	0.742	0.502	0.753	0.9584
Q24	3.078	1.110	0.120	-1.072	0.686	0.463	0.762	0.9587
Q26	3.682	0.989	-0.509	-0.344	0.693	0.471	0.685	0.9587
Q30	3.898	0.921	-0.676	0.086	0.702	0.478	0.647	0.9587
Q34	3.336	1.130	-0.144	-1.115	0.691	0.466	0.781	0.9587
Q35	2.905	1.222	0.182	-1.127	0.592	0.399	0.723	0.9595
Q37	3.620	0.961	-0.344	-0.421	0.687	0.467	0.660	0.9588
Q38	3.698	0.943	-0.483	-0.155	0.561	0.385	0.529	0.9596
Q41	3.284	1.004	0.040	-0.890	0.630	0.429	0.632	0.9591
Q42	3.748	0.913	-0.459	-0.260	0.727	0.496	0.664	0.9586
Q43	2.833	1.135	0.557	-0.860	0.594	0.403	0.674	0.9594
Q46	3.586	0.989	-0.388	-0.593	0.672	0.458	0.665	0.9589

Q49	3.073	1.036	0.213	-0.858	0.537	0.366	0.556	0.9598
Q51	3.348	1.124	-0.120	-1.061	0.768	0.517	0.864	0.9581
Q52	3.396	1.184	-0.312	-0.958	0.566	0.383	0.670	0.9597
Q53	3.439	1.018	-0.189	-0.818	0.650	0.442	0.662	0.9590
Q55	3.483	1.019	-0.446	-0.500	0.571	0.388	0.582	0.9595
Q56	2.960	1.162	0.213	-1.058	0.581	0.392	0.675	0.9596
Q57	3.870	0.854	-0.653	0.290	0.565	0.388	0.482	0.9596
Q63	3.759	1.042	-0.696	-0.231	0.689	0.466	0.718	0.9587
Q69	3.740	1.120	-0.718	-0.391	0.635	0.428	0.710	0.9591

Cronbach's Coefficient alpha = 0.9603; k = 31, n = 677

Table 7.8: Item analysis of the responses on the AGAQ for the total group: Factor 2

Item	Mean of item	Standard deviation	Skewness	Kurtosis	Item-test correlation	Mean inter-item correlation	Reliability index of item	Alpha if item is deleted
	xg	sg	sk	ku	rg	xir	rg*sg	∝
q14	3.644	0.925	-0.623	-0.065	0.477	0.269	0.442	0.8734
q21	3.474	0.951	-0.707	-0.168	0.592	0.328	0.562	0.8671
q23	3.250	1.008	-0.319	-0.730	0.610	0.338	0.614	0.8659
q25	3.534	0.989	-0.763	-0.109	0.576	0.319	0.569	0.8680
q27	3.120	0.981	-0.260	-0.845	0.619	0.342	0.607	0.8654
q33	3.318	1.036	-0.589	-0.564	0.482	0.271	0.499	0.8737
q45	3.248	1.042	-0.396	-0.767	0.693	0.379	0.722	0.8606
q47	2.766	0.979	0.247	-0.635	0.503	0.282	0.492	0.8722
q58	2.682	1.091	0.194	-0.933	0.605	0.333	0.659	0.8662
q62	2.477	1.014	0.348	-0.582	0.550	0.304	0.557	0.8695
q67	3.414	1.018	-0.657	-0.564	0.614	0.338	0.625	0.8656
q70	2.616	0.929	0.487	-0.189	0.529	0.294	0.491	0.8707

Cronbach's Coefficient alpha = 0.8779; k = 12, n = 698

The item analysis of Factor 1 (Table 7.7) and Factor 2 (Table 7.8) reveals that about all of the item means vary between 2 and 4, with an approximate standard deviation varying between 0.9 and 1.3. Accordingly, most of the skewness coefficients are negative. These coefficients vary between -0.01 and -1.1. Most of the responses on the items are platykurtically distributed, which indicates that the scores were evenly distributed. With the exception of Q22 and Q51, the mean inter-item correlations are considered acceptable, compared to the guideline of 0.15 >r<0.50 (Clark & Watson, 1995). It appears that the scales of the AGAQ have acceptable levels of internal consistency. The Cronbach alpha coefficients of both the factors scales (Factor 1 $\propto$=0.9603; Factor 2 $\propto$ =0.8779) are considered to be highly acceptable, compared to the guideline of alpha >0.70 (Nunnally & Bernstein, 1994; Smit, 1991). All items were retained for the two separate factors.

The descriptive statistics of the two factors are reproduced in Table 7.9.

Table 7.9: Descriptive statistics and reliability of the two factors (n=713)

Factor	Mean score	Standard deviation	Skewness		Kurtosis	
	M	sg	sk	Std. error	ku	Std. error
F1	107.73	21.224	-0.111	0.092	-0.104	0.183
F2	37.62	7.718	-0.244	0.092	0.115	0.183

Table 7.9 indicates that the scores of the sample on both factors are approximately normally distributed. The assumption of normality requires that the key statistics, skewness and kurtosis be less than 2.5 times the standard error (Morgan & Griego, 1998:49).

7.6 SCALE NAMING/DESCRIPTION

The description and naming of the factors is based on the analysis of the five statements that have the highest connotation in each factor.

- **Factor 1**

  This factor predominantly relates to the aptitude for flying that a person may or may not be seen to possess. For the purposes of this study, it relates to how proficient either gender is seen to be at the task of pilotage. The principal elements in this factor relate to learning ability, the speed at which concepts related to flying are understood, decision-making in flying, general piloting skills, and comfort level with regard to stick and rudder controls. This factor is referred to as **Flying Proficiency**.

- **Factor 2**

  This factor relates to the level of risk-taking amongst pilots of a particular gender, safety consciousness, attention to detail and prudence. This factor is referred to as **Safety Orientation**.

7.7 ANALYSIS OF VARIANCE

7.7.1 Students' t-test

The Analyses of Variance (ANOVAs) were conducted by means of the SPSS Program. The t-test is appropriate when the researcher has a single interval dependent variable and a dichotomous independent variable and wishes to test the difference of means (North Carolina State University, 2002). For the purposes of this study, the t-test was used in order to determine whether there are statistical significant differences between the mean scores of male pilots and female pilots' perceptions of gender-related pilot behaviour. The results are set out in Table 7.10.

Levene's test of homogeneity of variance was calculated. Levene's F showed a non-significant difference of 0.231 for Factor 1 and 0.830 for Factor 2. The null hypothesis is therefore accepted that the groups have equal variance and that the assumption of homogeneity is not violated.

Table 7.10: Comparison of the mean scores of male and female pilots' perceptions of gender-related pilot behaviour

Dependent variable	Gender	N	Mean	Std. deviation	Levene's statistic F	Levene's statistic Sig	t	Sig. (2-tailed)	Practical sig. d
F1	Male	544	101.8253	18.97365	1.435	0.231	-15.373	0.000*	1.313
	Female	169	126.7356	16.40901					
F2	Male	544	36.2778	7.28542	0.046	0.830	-8.785	0.000*	0.757
	Female	169	41.9530	7.49520					

*p< 0.001

The t-test indicates a statistically significant difference between the mean scores of male and female pilots for Factor 1 (t = -15.373; p<0.001) and for Factor 2 (t = -8.785; p<0.001). The female pilots seem to have a much more positive perception of their Flying Proficiency (F1) and their Safety Orientation (F2) than the male pilots have of their (female pilots') abilities.

Practical significance (d) between attitudes of the two genders was also calculated using the following formula: d=$Mean_1$-$Mean_2$/SDmax, where:

d is >0.50, the practical significance, is medium; and

d is >0.80, the practical significance is large.

According to this research, the practical significance is large for Factor 1 and at a medium level for Factor 2. This means that there are major differences between the attitudes of male and female pilots.

7.7.2 One-way analysis of variance

A series of one-way ANOVAs was carried out in order to determine whether pilots' attitudes (the dependent variable) differed significantly due to education level, type of pilot certification, position, opportunity to fly with the opposite gender, age and flying time (the independent variables). The results are set out in Tables 7.12 and 7.13.

First Levene's test of homogeneity of variances was computed using the SPSS in order to test the ANOVA assumption that each category of the independent variables has the same variance (North Carolina State University, 2002). The results are set out in Table 7.11.

Table 7.11: Levene's test of homogeneity of variances

Dependent variable	Independent variable	Levene's statistic	
		F	Sig.
Factor 1	Education	1.940	**0.122***
Factor 2		0.213	**0.887***
Factor 1	Position	4.836	0.008
Factor 2		2.653	**0.071***
Factor 1	Certification	4.681	0.003
Factor 2		3.996	0.008
Factor 1	Fly with opposite gender	2.113	**0.078***
Factor 2		1.167	**0.324***
Factor 1	Age	1.518	**0.209***
Factor 2		0.496	**0.685***
Factor 1	Flying time	3.013	0.006
Factor 2		1.460	**0.189***

*p>0.05

The results indicate that the error variance of the dependent variables has been met for the categories of education (Factor 1 and Factor 2), position (Factor 2), fly with opposite gender (Factor 1 and Factor 2), age (Factor 1 and Factor 2) and flying time (Factor 2). Failure to meet the assumption of homogeneity is not necessarily serious for the ANOVA, as it is relatively vigorous, particularly when groups are of equal size (North Carolina State University, 2002).

Where Levene's test of homogeneity of variance confirmed that the assumption of equality of variance was met ($p>0.05$), Scheffé's *post hoc* multiple comparison technique was used to determine the statistical difference between groups. In cases where these conditions were not met ($p<0.05$), Dunnett's C multiple comparison test was employed.

The Scheffé test is considered to be one of the more meticulous methods of comparing groups, in that the F values are computed simultaneously for all possible comparison pairs (North Carolina State University, 2002). Due to the large number of respondents in this study, the Scheffé test was selected to diminish the possibility of Type One errors. The results of the *post hoc* Scheffé and Dunnett's C test are set out in Tables 7.14 to 7.19.

Table 7.12: One-way ANOVA: Flying Proficiency (Factor 1) by independent variables

Factor 1: Flying Proficiency	Sum of squares	df	Mean square	Root mean square	F	p(F)
Education Level						
Between groups	26213.348	3	8737.783	93.476	21.006	0.000*
Within groups	294502.55	708	415.964	20.395		
Total	320715.90	711				

Position						
Between groups	18305.573	2	9152.786	95.670	21.571	0.000*
Within groups	290658.56	685	424.319	20.599		
Total	308964.14	687				
Certification						
Between groups	9782.535	3	3260.845	57.104	7.435	0.000*
Within groups	310944.08	709	438.567	20.942		
Total	320726.61	712				
Fly with opposite gender						
Between groups	50510.011	4	12627.503	112.372	33.042	0.000*
Within groups	270188.78	707	382.162	19.549		
Total	320698.80	711				
Age						
Between groups	11972.345	3	3990.782	63.173	9.324	0.000*
Within groups	290190.01	678	428.009	20.688		
Total	302162.35	681				
Flying time						
Between groups	8808.107	6	1468.018	38.315	3.325	0.003[1]
Within groups	308607.23	699	441.498	21.012		
Total	317415.34	705				

*p<0.001

[1]p<0.003

Table 7.13: One-way ANOVA: Safety Orientation (Factor 2) by independent variables

Factor 2: Safety Orientation	Sum of squares	df	Mean square	Root mean square	F	p(F)
Education level						
Between groups	2379.470	3	793.157	28.163	14.048	0.000*
Within groups	39974.245	708	56.461	7.514		
Total	42353.715	711				
Position						
Between groups	2395.692	2	1197.846	34.610	21.100	0.000*
Within groups	38886.689	685	56.769	7.535		
Total	41282.382	687				
Certification level						
Between groups	1157.275	3	385.758	19.641	6.630	0.000*
Within groups	41254.631	709	58.187	7.628		
Total	42411.906	712				
Fly with opposite gender						
Between groups	2669.522	4	667.380	25.834	11.889	0.000*
Within groups	39687.887	707	56.136	7.492		
Total	42357.409	711				

Age						
Between groups	129.632	3	43.211	6.574	0.727	0.536
Within groups	40324.517	678	59.476	7.712		
Total	40454.149	681				
Flying time						
Between groups	2377.061	6	396.177	19.904	6.956	0.000*
Within groups	39809.606	699	56.952	7.547		
Total	42186.667	705				

*p<0.001

The practical significance (d) within the various groups was calculated using the following formula: $d=Mean_1-Mean_2/Root\ MSE$. For the purposes of this research, the guidelines for effect size recommended by Cohen (1988) were used. The cut-off point of 0.50 (medium effect) was set for the practical significance of differences between means for this research.

7.7.2.1 Flying Proficiency

From the one-way analyses of variance (ANOVA) set out in Tables 7.12, it appears that there are statistically significant differences between the mean scores for different biographical subsets with regard to Factor 1 (Flying Proficiency).

- **Education.** The results of the one-way ANOVA , set out in Table 7.12, indicated that pilots' levels of education have a statistically significant (F(3.708)=21.006; p<0.001) effect on their perceptions of females' Flying Proficiency. The Scheffé *post hoc* test was used to determine the statistical differences between the subgroups. Significant differences occurred between the following subgroups: respondents with a High School education and those with a Bachelor's degree (mean difference = -10.1483; practical significance = 0.50) and those with a Graduate degree (mean difference = -14.2127; practical significance = 0.70). Furthermore, significant differences also occurred between respondents with a

Technical Diploma and those with a Bachelor's degree (mean difference = -11.9893; practical significance = 0.59), and those with a Graduate degree (mean difference = -16.0537; practical significance = 0.79). The integrated results are set out in Table 7.14. The direction of the difference in the mean scores appears to be

- o Pilots with Bachelor's and Graduate degrees > Technical Diplomas and High School education.

▪ **Position.** As indicated in Table 7.12, the position in which pilots operate (level of command) is statistically significantly (F(2.685)=21.571; p<0.001) related to their perceptions of female pilots' Flying Proficiency. The Dunnett's C *post hoc* test indicates that significant differences occurred between the following subgroups: Single Pilot with Captain: Multi-Crew (mean difference = -11.3561; practical significance = 0.55) and First Officer: Multi-Crew (mean difference = -10.5448, practical significance = 0.52). The integrated results are depicted in Table 7.15. The direction of the difference in the mean scores appears to be:

- o Single pilot in command > Captain and First Officer: Multi-Crew.

▪ **Certification.** The results of the one-way ANOVA indicated a statistically significant (F(3.709)=7.435; p<0.001) relationship between certification and respondents' perceptions of Flying Proficiency, as set out in Table 7.12. The Dunnett's C *post hoc* test indicates that significant differences occurred between the following subgroups: Private Pilots and Commercial Pilots (mean difference = 8.3847; practical significance = 0.40), and Flight Instructors (mean difference = 7.5294; practical significance = 0.36) and Airline Transport Pilots (ATPs) (mean difference = 10.9854; practical significance = 0.52). The integrated results are set out in Table 7.16. The direction of the difference in the mean scores appears to be:

- o Private Pilot Licence > Airline Transport Pilot (ATP), Commercial Pilot and Flight Instructor.

▪ **Fly with the opposite gender.** The results of the one-way ANOVA indicated that opportunity to fly with the opposite gender affected the respondents' perceptions of female pilots' Flying Proficiency in a statistically significant manner (F(4.707)=33.042; p<0.001). The Scheffé *post hoc* test indicates that significant differences occurred between the following subgroups: Never and Often (mean difference = -24.3600; practical significance = 1.25) and Mostly (mean difference = -24.1824; practical significance = 1.24); Rarely and Often (mean difference = -19.7565: practical significance = 1.01) and Mostly (mean difference = -19.5789; practical significance = 1.00). Sometimes and Often (mean difference =

-20.7411; practical significance = 1.06) and Mostly (mean difference = -20.5635; practical significance = 1.05). The integrated results are set out in Table 7.17. The direction of the difference in the mean scores appears to be:

- Mostly and Often > Rarely, Sometimes and Never

- **Age.** As indicated in Table 7.12, age is statistically significantly (F(3.678)=9.324; p<0.001) related to pilots' perceptions of females' Flying Proficiency. The Scheffé *post hoc* test indicates that significant differences occurred in the following subgroups: age <29 and ages 40 to 49 (mean difference = -10.0414; practical significance = 0.50) and ages 50 to 69 (mean difference = -11.0151; practical significance = 0.53). The integrated results are set out in Table 7.18. The direction of the difference in the mean scores appears to be:
  - Age group 40 years plus > Age group 29 years and younger.

- **Flying time.** The results of the one-way ANOVA regarding the effect of flying time on pilots' perceptions of females' Flying Proficiency indicated significant perceptual differences (F(6.669)=3.325; p<0.003). The Dunnett's C *post hoc* test indicates that significant differences occurred in the following subgroups: 301 to 100 hours and 6901 to 11000 hours (mean difference = 11.1301; practical significance = 0.53). The integrated results are depicted in Table 7.19. The direction of the difference in the mean scores appears to be:
  - Pilots with 301-1000 flying hours > Pilots with 6901-11000 flying hours.

7.7.2.2 Safety Orientation

From the one-way analyses of variance (ANOVA) set out in Table 7.13, it appears that there are statistically significant differences between the mean scores for different biographical subsets with regard to Factor 2 (Safety Orientation).

- **Education**. The results of the one-way ANOVA set out in Table 7.13 indicate that pilots' levels of education have a statistically significant (F(3.708)=14.048; p<0.001) effect on their perceptions of female pilots' Safety Orientation. The Scheffé *post hoc* test indicated that significant differences occurred in the following subgroups: respondents with a High School education and those with a Technical Diploma (mean difference = -3.6438; practical significance = 0.48), and those with a Bachelor's degree (mean difference = -2.5846; practical significance = 0.34), and those with a Graduate degree (mean difference = -4.5101; practical significance =

0.60). The integrated results are set out in Table 7.14. The direction of the difference in the mean scores appears to be:

- o Pilots with Technical Diplomas, Bachelors and Graduate degrees > High School education.

- **Position.** As indicated in Table 7.13, the position in which pilots operate (level of command) is statistically significantly (F(2.685)=21.100; p<0.001) related to their perceptions of female pilots' Safety Orientation. The Scheffé *post hoc* test indicates that significant differences occurred between the following subgroups: Single Pilot and Captain: Multi-Crew (mean difference = 4.4473; practical significance = 0.60) and First Officer: Multi-Crew (mean difference = 2.4320; practical significance = 0.32). Captain: Multi-Crew and First Officer: Multi-Crew (mean difference = -2.0153; practical significance = 0.27). The integrated results are set out in Table 7.15. The direction of the difference in the mean scores appears to be:
  - o Single pilots in command > Captains: Multi-crew > First Officer: Multi-crew.

- **Certification.** The results of the one-way ANOVA indicated a statistically significant (F(3.709)=6.630; p<0.001) relationship between certification and perceptions of Safety Orientation, as set out in Table 7.13. The Dunnett's C *post hoc* test indicated that significant differences occurred between the following subgroups: Private Pilots and Flight Instructors (mean difference = 3.0614; practical significance = 0.40) and Airline Transport Pilots (ATP) (mean difference = 3.5005; practical significance = 0.46). The integrated results are set out in Table 7.16. The direction of the difference in the mean scores appears to be:
  - o Private pilots > Flight Instructors and Airline Transport Pilots.

- **Fly with opposite gender.** The results of the one-way ANOVA indicated that opportunity to fly with the opposite gender affected the respondents' perceptions of female pilots' Safety Orientation in a statistically significant manner (F(4.707)=11.899; p<0.001). The Scheffé *post hoc* test indicated that significant differences occurred in the following subgroups: Never and Mostly (mean difference = -5.5088; practical significance = 0.74). Rarely and Often (mean difference = -3.7111; practical significance = 0.50) and Mostly (mean difference = -5.4913, practical significance = 0.47). The integrated results are set out in Table 7.17. The direction of the difference in the mean scores appears to be
  - o Mostly > never and rarely; and
  - o Often > rarely.

- **Age.** The results of the one-way ANOVA indicated that age had no statistical significant ($p=0.536$) effect on the respondents' perceptions of female pilots' Safety Orientation. It was therefore not necessary to carry out a *post hoc* test.

- **Flying time.** The results of the one-way ANOVA regarding the effect of flying time on pilots' perceptions of females' Safety Orientation indicated significant perceptual differences ($F(6.699)=6.956$; $p<0.001$). The Scheffé *post hoc* test indicates that significant differences occurred in the following subgroups: 40 to 300 hours and 4801 to 6900 hours (mean difference = 5.1383; practical significance = 0.68), and 6901 to 11000 hours (mean difference = 4.9412; practical significance = 0.65) and 11001 to 23400 hours (mean difference = 5.6634; practical significance = 0.75). The integrated results are set out in Table 7.19. The direction of the difference in the mean scores appears to be:
  - Pilots with 40-300 flying hours > Pilots with 4501-23400 flying hours.

Table 7.14: ***Post hoc*** **multiple comparisons of education in relation to Flying Proficiency (Factor 1) and Safety Orientation (Factor 2)**

Dependent variable	*Post hoc* Test	(I)Education Level/ Mean factor score	(J) Education level	Mean difference (i-j)	Standard error	d	Effect size
Factor 1	**Scheffé**	High School	Technical Diploma	1.8410	2.44725		
Flying Proficiency		$\overline{X}$ =103.5253	Bachelors' Degree	-10.1483*	1.97202	0.50	Medium
			Graduate Degree	-14.2127*	2.19849	0.70	Medium
		Technical Diploma	High School	-1.8410	2.44725		
		$\overline{X}$ =101.6843	Bachelors' Degree	-11.9893*	2.75198	0.59	Medium
			Graduate Degree	-16.0537*	2.91854	0.79	Medium
		Bachelors Degree	High School	10.1483*	1.97202	0.50	Medium
		$\overline{X}$ =113.6736	Technical Diploma	11.9893*	2.75198	0.59	Medium
			Graduate Degree	-4.0643*	2.53332	0.20	Small
		Graduate Degree	High School	14.2127*	2.19849	0.70	Medium
		$\overline{X}$ =117.7380	Technical Diploma	16.0537*	2.91854	0.79	Medium
			Bachelors' Degree	4.0643	2.53332		

Dependent variable	*Post hoc* Test	(I)Education Level/ Mean factor score	(J) Education level	Mean difference (i-j)	Standard error	d	Effect size
Factor 2 Safety Orientation	**Scheffé**	High School $\overline{X}$ =35.9260	Technical Diploma	-3.6438*	0.90162	0.48	Small
			Bachelors' Degree	-2.5846*	0.72654	0.34	Small
			Graduate Degree	-4.5101*	0.80997	0.60	Medium
		Technical Diploma $\overline{X}$ =39.5698	High School	3.6438*	0.90162	0.48	Small
			Bachelors' Degree	1.0592	1.01389		
			Graduate Degree	-0.8664	1.07526		
		Bachelors Degree $\overline{X}$ =38.5106	High School	2.5846*	0.72654	0.34	Small
			Technical Diploma	-1.05923	1.01389		
			Graduate Degree	-1.9255	0.93333		
		Graduate Degree $\overline{X}$ =40.4361	High School	4.5101*	0.80997	0.60	Medium
			Technical Diploma	0.8664	1.07526		
			Bachelors' Degree	1.9255	0.93333		

*$p<0.05$

Table 7.15: *Post hoc* multiple comparisons of position in relation to Flying Proficiency (Factor 1) and Safety Orientation (Factor 2)

Dependent variable	*Post hoc* test	(I) Position/ Mean factor score	(J) Position	Mean difference (i-j)	Standard error	d	Effect size
Factor 1	**Dunnett's C**	Captain: Multi-crew	First Officer: Multi-crew	-0.7112	1.83050		
Flying Proficiency		$\overline{X}$ =104.0735	Single Pilot	-11.3561*	1.93849	0.55	Medium
		First Officer: Multi-crew	Captain: Multi-crew	0.7112	1.83050		
		$\overline{X}$ =104.7847	Single Pilot	-10.6448*	2.06027	0.52	Medium
		Single Pilot	Captain: Multi-crew	11.3561*	1.93849	0.55	Medium
		$\overline{X}$ =115.4296	First Officer: Multi-crew	10.6448*	2.06027	0.52	Medium
Factor 2	**Scheffé**	Captain: Multi-crew	First Officer: Multi-crew	-2.0153*	0.70441	0.27	Small
Safety Orientation		$\overline{X}$ =35.6253	Single Pilot	-4.4473*	0.68462	0.60	Medium
		First Officer: Multi-crew	Captain: Multi-crew	2.0153*	0.70441	0.27	Small
		$\overline{X}$ =37.6406	Single Pilot	-2.4320*	0.73887	0.32	Small
		Single Pilot	Captain: Multi-crew	4.4473*	0.68462	0.60	Medium
		$\overline{X}$ =40.0726	First Officer: Multi-crew	2.4320*	0.73887	0.32	Small

*p<0.05

Table 7.16: ***Post hoc*** **multiple comparisons of certification in relation to Flying Proficiency (Factor 1) and Safety Orientation (Factor 2)**

Dependent variable	*Post hoc* test	(I) Certification/ Mean factor score	(J) Certification	Mean difference (i-j)	Standard error	d	Effect size
Factor 1	**Dunnett's C**	Private Pilot	Commercial Pilot	8.3847*	3.14264	0.40	Small
Flying Proficiency		$\overline{X}$ =115.9013	Flight Instructor	7.5294*	2.66396	0.36	Small
			Airline Transport Pilot	10.9854*	2.38936	0.52	Medium
		Commercial Pilot	Private Pilot	-8.3847*	3.14264	0.40	Small
		$\overline{X}$ =107.5166	Flight Instructor	-0.8553	2.79168		
			Airline Transport Pilot	2.6007	2.53098		
		Flight Instructor	Private Pilot	-7.5294*	2.66396	0.36	Small
		$\overline{X}$ =108.3719	Commercial Pilot	0.8553	2.79168		
			Airline Transport Pilot	3.4560	1.90428		
		Airline Transport Pilot	Private Pilot	-10.9854*	2.38936	0.52	Medium
		$\overline{X}$ =104.9159	Commercial Pilot	-2.6007	2.53098		
			Flight Instructor	-3.4560	1.90428		

Dependent variable	***Post hoc* test**	**(I) Certification/ Mean factor score**	**(J) Certification**	**Mean difference (i-j)**	**Standard error**	**d**	**Effect size**
Factor 2	**Dunnett's C**	Private Pilot	Commercial Pilot	1.5312	1.03980		
Safety Orientation		$\overline{X}$ =40.1704	Flight Instructor	3.0614*	1.02125	0.40	Small
			Airline Transport Pilot	3.5005*	0.82502	0.46	Small
		Commercial Pilot	Private Pilot	-1.5312	1.03980		
		$\overline{X}$ =38.6391	Flight Instructor	1.5302	1.02312		
			Airline Transport Pilot	1.9693	0.82734		
		Flight Instructor	Private Pilot	-3.0614*	1.02125	0.40	Small
		$\overline{X}$ =37.1089	Commercial Pilot	-1.5302	1.02312		
			Airline Transport Pilot	0.4391	0.80390		
		Airline Transport Pilot	Private Pilot	-3.5005*	0.82502	0.46	Small
		$\overline{X}$ =36.6698	Commercial Pilot	-1.9693	0.82734		
			Flight Instructor	-0.4391	0.80390		

*$p<0.05$

Table 7.17: *Post hoc* multiple comparisons of opportunity to fly with opposite gender in relation to Flying Proficiency (Factor 1) and Safety Orientation (Factor 2)

Dependent variable	*Post hoc* test	(I) Fly with opposite gender/ Mean factor score	(J) Fly with opposite gender	Mean difference (i-j)	Standard error	d	Effect size
Factor 1	**Scheffé**	Never	Rarely	-4.6035	2.45937		
Flying Proficiency		$\overline{X}$ =99.6093	Sometimes	-3.6189	3.08029		
			Often	-24.3600*	3.24884	1.25	Large
			Mostly	-24.1824*	3.15167	1.24	Large
		Rarely	Never	4.6035	2.45937		
		$\overline{X}$ =104.2128	Sometimes	0.9846	2.31208		
			Often	-19.7565*	2.53229	1.01	Large
			Mostly	-19.5789*	2.40635	1.00	Large
		Sometimes	Never	3.6189	3.08029		
		$\overline{X}$ =103.2281	Rarely	-0.9846	2.31208		
			Often	-20.7411*	3.13881	1.06	Large
			Mostly	-20.5635*	3.03812	1.05	Large
		Often	Never	24.3600*	3.24884	1.25	Large
		$\overline{X}$ =123.7917	Rarely	19.7565*	2.53229	1.01	Large

Dependent variable	*Post hoc* test	(I) Fly with opposite gender/ Mean factor score	(J) Fly with opposite gender	Mean difference (i-j)	Standard error	d	Effect size
			Sometimes	20.7411*	3.13881	1.06	Large
			Mostly	0.1776	3.20889		
		Mostly	Never	24.1824*	3.15167	1.24	Large
		$\overline{X}$ =123.9692	Rarely	19.5789*	2.40635	1.00	Large
			Sometimes	20.5635*	3.03812	1.05	Large
			Often	-0.1776	3.20889		
Factor 2	**Scheffé**	Never	Rarely	-0.0175	0.94258		
Safety Orientation		$\overline{X}$ =36.3548	Sometimes	-2.2110	1.18056		
			Often	-3.7285	1.24516		
			Mostly	-5.5088*	1.20791	0.74	Medium
		Rarely	Never	0.0175	0.94258		
		$\overline{X}$ =36.3723	Sometimes	-2.1935	0.88613		
			Often	-3.7111*	0.97053	0.50	Medium
			Mostly	-5.4913*	0.92226	0.47	Small
		Sometimes	Never	2.2110	1.18056		
		$\overline{X}$ =38.5658	Rarely	2.1935	0.88613		

Dependent variable	*Post hoc* test	(I) Fly with opposite gender/ Mean factor score	(J) Fly with opposite gender	Mean difference (i-j)	Standard error	d	Effect size
			Often	-1.5176	1.20299		
			Mostly	-3.2978	1.16439		
		Often	Never	3.7285	1.24516		
		$\overline{X}$ =40.0834	Rarely	3.7111*	0.97053	0.50	Medium
			Sometimes	1.5176	1.20299		
			Mostly	-1.7802	1.22984		
		Mostly	Never	5.5088*	1.20791	0.74	Medium
		$\overline{X}$ =41.8636	Rarely	5.4913*	0.92226	0.47	Small
			Sometimes	3.2978	1.16439		
			Often	1.7802	1.22984		

*p<0.05

Table 7.18: ***Post hoc*** **multiple comparisons of age in relation to Flying Proficiency (Factor 1) and Safety Orientation (Factor 2)**

Dependent variable	*Post hoc* test	(I) Age/ Mean factor score	(J) Age	Mean difference (i-j)	Standard error	d	Effect size
Factor 1	**Scheffé**	<29 years	30 – 39	-6.0197	2.18394		
Flying Proficiency		$\overline{X}$ =101.1282	40 – 49	-10.0414*	2.33142	0.50	Medium
			50 - 69	-11.0151*	2.31308	0.53	Medium
		30 – 39 years	<29	6.0197	2.18394		
		$\overline{X}$ =107.1479	40 – 49	-4.0218	2.19576		
			50 - 69	-4.9955	2.17627		
		40 – 49 years	<29	10.0414*	2.33142	0.50	Medium
		$\overline{X}$ =111.1697	30 – 39	4.0218	2.19576		
			50 - 69	-0.9737	2.32424		
		50 - 69 years	<29	11.0151*	2.31308	0.53	Medium
		$\overline{X}$ =112.1434	30 – 39	4.9955	2.17627		
			40 – 49	0.9737	2.32424		

Dependent variable	*Post hoc* test	(I) Age/ Mean factor score	(J) Age	Mean difference (i-j)	Standard error	d	Effect size
Factor 2	**Scheffé**	<29 years	30 – 39	-0.1492	0.81411		
Safety Orientation		$\overline{X}$ =37.7977	40 – 49	0.9900	0.86909		
			50 - 69	0.3488	0.86225		
		30 – 39 years	<29	0.1492	0.81411		
		$\overline{X}$ =37.9469	40 – 49	1.1392	0.81852		
			50 - 69	0.4979	0.81125		
		40 – 49 years	<29	0.9900	0.86909		
		$\overline{X}$ =36.8077	30 – 39	1.1392	0.81852		
			50 - 69	-0.6413	0.86641		
		50 - 69 years	<29	-0.3488	0.86225		
		$\overline{X}$ =37.4490	30 – 39	-0.4979	0.81125		
			40 – 49	0.6413	0.86641		

$^*p<0.05$

Table 7.19: ***Post hoc*** **multiple comparisons of flying time in relation to Flying Proficiency (Factor 1) and Safety Orientation (Factor 2)**

Dependent variable	*Post hoc* test	(I) Flying time/ Mean factor score	(J) Flying time	Mean difference (i-j)	Standard error	d	Effect size
Factor 1	**Dunnett's C**	40 – 300 hours	301 – 1000	-2.5564	3.31497		
Flying Proficiency		$\overline{X}$ =110.9347	1001 – 2600	1.2685	3.10421		
			2601 – 4800	4.4104	2.98464		
			4801 - 6900	4.1869	2.79219		
			6901 – 11000	8.5737	2.91547		
			11001 - 23400	6.1761	2.78045		
		301 – 1000 hours	40 – 300	2.5564	3.31497		
		$\overline{X}$ =113.4911	1001 – 2600	3.8249	3.39307		
			2601 – 4800	6.9669	328403		
			4801 - 6900	6.7434	3.11016		
			6901 – 11000	11.1301*	3.22129	0.53	Medium
			11001 - 23400	8.7325	3.09963		
		1001 – 2600 hours	40 – 300	-1.2685	3.10421		
		$\overline{X}$ =109.6662	301 – 1000	-3.8249	3.39307		
			2601 – 4800	3.1419	3.07115		

Dependent variable	*Post hoc* test	(I) Flying time/ Mean factor score	(J) Flying time	Mean difference (i-j)	Standard error	d	Effect size
			4801 - 6900	2.9184	2.88447		
			6901 – 11000	7.3052	3.00396		
			11001 - 23400	4.9076	2.87311		
		2601 – 4800 hours	40 – 300	-4.4104	2.98464		
		$\overline{X}$ =106.5242	301 – 1000	-6.9669	3.28403		
			1001 – 2600	-3.1419	3.07115		
			4801 - 6900	-0.2235	2.75538		
			6901 – 11000	4.1633	2.88023		
			11001 - 23400	1.7656	2.74348		
		4801 - 6900 hours	40 – 300	-4.1869	2.79219		
		$\overline{X}$ =106.7477	301 – 1000	-6.7434	3.11016		
			1001 – 2600	-2.9184	2.88447		
			2601 – 4800	0.2235	2.75538		
			6901 – 11000	4.3867	2.68030		
			11001 - 23400	1.9891	2.53277		
		6901 – 11000 hours	40 – 300	-8.5737	2.91547		
		$\overline{X}$ =102.3610	301 – 1000	-11.1301*	3.22129	0.53	Medium

Dependent variable	*Post hoc* test	(I) Flying time/ Mean factor score	(J) Flying time	Mean difference (i-j)	Standard error	d	Effect size
			1001 – 2600	-7.3052	3.00396		
			2601 – 4800	-4.1633	2.88023		
			4801 - 6900	-4.3867	2.68030		
			11001 - 23400	-2.3976	2.66806		
		11001 - 23400 hours	40 – 300	-6.1761	2.78045		
		$\overline{X}$ =104.7586	301 – 1000	-8.7325	3.09963		
			1001 – 2600	-4.9076	2.87311		
			2601 – 4800	-1.7656	2.74348		
			4801 - 6900	-1.9891	2.53277		
			6901 – 11000	2.3976	2.66806		
Factor 2	**Scheffé**	40 – 300 hours	301 – 1000	2.3176	1.06995		
Safety Orientation		$\overline{X}$ =41.1654	1001 – 2600	3.7046	1.08416		
			2601 – 4800	2.8013	1.04731		
			4801 - 6900	5.1383*	1.06726	0.68	Medium
			6901 – 11000	4.9412*	1.05695	0.65	Medium
			11001 - 23400	5.6634*	1.06462	0.75	Medium

Dependent variable	*Post hoc* test	(I) Flying time/ Mean factor score	(J) Flying time	Mean difference (i-j)	Standard error	d	Effect size
		301 – 1000 hours	40 – 300	-2.3176	1.06995		
		$\overline{X}$ =38.8468	1001 – 2600	1.3870	1.08681		
			2601 – 4800	0.4836	1.05005		
			4801 - 6900	2.8207	1.06995		
			6901 – 11000	2.6235	1.05967		
			11001 - 23400	3.3457	1.06731		
		1001 – 2600 hours	40 – 300	-3.7046	1.08416		
		$\overline{X}$ =37.4598	301 – 1000	-1.3870	1.08681		
			2601 – 4800	-0.9034	1.06452		
			4801 - 6900	1.4337	1.08416		
			6901 – 11000	1.2365	1.07401		
			11001 - 23400	1.9587	1.08155		
		2601 – 4800 hours	40 – 300	-2.8013	1.04731		
		$\overline{X}$ =38.3632	301 – 1000	-0.4836	1.05005		
			1001 – 2600	0.9034	1.06452		

Dependent variable	*Post hoc* test	(I) Flying time/ Mean factor score	(J) Flying time	Mean difference (i-j)	Standard error	d	Effect size
			4801 - 6900	2.3371	1.04731		
			6901 - 11000	2.1399	1.03680		
			11001 - 23400	2.8621	1.04461		
		4801 - 6900 hours	40 – 300	-5.1383*	1.06726	0.68	Medium
		$\overline{X}$ =36.0261	301 – 1000	-2.8207	1.06995		
			1001 – 2600	-1.4337	1.08416		
			2601 – 4800	-2.3371	1.04731		
			6901 – 11000	-0.1972	1.05695		
			11001 - 23400	0.5250	1.06462		
		6901 – 11000 hours	40 – 300	-4.9412*	1.05695	0.65	Medium
		$\overline{X}$ =36.2233	301 – 1000	-2.6235	1.05967		
			1001 – 2600	-1.2365	1.07401		
			2601 – 4800	-2.1399	1.03680		
			4801 - 6900	0.1972	1.05695		
			11001 - 23400	0.7222	1.05428		
		11001 - 23400 hours	40 – 300	-5.6634*	1.06462	0.75	Medium
		$\overline{X}$ =37.4598	301 – 1000	-3.3457	1.06731		

Dependent variable	*Post hoc* test	(I) Flying time/ Mean factor score	(J) Flying time	Mean difference (i-j)	Standard error	d	Effect size
			1001 – 2600	-1.9587	1.08155		
			2601 – 4800	-2.8621	1.04461		
			4801 - 6900	-0.5250	1.06462		
			6901 – 11000	0.7222	1.05428		

*p<0.05

7.7.2.3 Comment on the above results

Caution is required when interpreting the reported results as the difference between groups may be artificially inflated. At this point it must be acknowledged that the variance between groups and subsets may be an artefact of the composition of the current sample. From cross-tabulation of the biographic data by gender, it is evident that the majority of the United States respondents were females (82.8%) and those in South Africa were males (92.1%). Of the total sample, 74.6 per cent of the female pilots hold a bachelor or graduate degree, in comparison to only 25.6 per cent of the male pilots. The majority of the female respondents hold a private pilot's licence (77.6%), while the majority of the male pilots (93.2%) are CPL and ATP-licensed pilots. The male pilots were mostly Captains (49.0%) and First Officers (33.2%) operating in a multi crew environment, while the female pilots were operating mainly (77.6%) as single pilots in command. The majority of the female pilots (62.5%) fall into the 40 years and older age groups and the male pilots (58.4%) in the 39 years and younger age groups. Although the male pilots are younger, their average flight time was more than 3.3 times higher than that of the female pilots.

In addition to doing a cross-tabulation, the coefficient of association was calculated in order to determine the relationship between gender and other independent variables. The Phi-coefficients were computed to test for the strength of association between gender (male versus female), with the independent variables of education, certification, position, opportunity to fly with the opposite gender, age and flying time. The Phi-coefficients and strength of association are summarized in Table 7.20.

Table 7.20: Phi coefficient of association between the independent variables and strength of association

	Gender	Education	Certification	Position	Fly with opposite gender	Age	Flying time
Gender							
Phi	-	0.451	0.482	0.547	0.820	0.214	0.479
Effect size		medium	medium	large	large	small	medium
n		712	713	688	712	682	706

Education							
Phi	0.451	-	0.264	0.314	0.367	0.340	0.264
Effect size	medium		small	medium	medium	medium	small
n	712		712	687	711	681	705
Certification							
Phi	0.482	0.264	-	0.718	0.450	0.327	0.993
Effect size	medium	small		large	medium	medium	large
n	713	712		688	712	682	706
Position							
Phi	0.547	0.314	0.718	-	0.484	0.472	0.846
Effect size	large	medium	large		medium	medium	large
n	688	687	688		688	659	681
Fly with opposite gender							
Phi	0.820	0.367	0.450	0.484	-	0.291	0.519
Effect size	large	medium	medium	medium		small	large
n	712	711	712	688		681	705
Age							
Phi	0.214	0.340	0.327	0.472	0.291	-	0.748
Effect size	small	medium	medium	medium	small		large
n	682	681	682	659	681		676
Flying time							
Phi	0.479	0.264	0.993	0.846	0.519	0.748	-
Effect size	medium	small	large	large	large	large	
n	706	705	706	681	705	676	

Practically significant associations were found between gender and education (Phi = 0,451; ω = medium), certification (Phi = 0.482; ω = medium), position (Phi = 0.547; ω = large), fly with the opposite gender (Phi = 0.820; ω = large), age (Phi = 0.214; ω = small) and flying time (Phi = 0.479; ω = medium). Flying time was significantly related to certification, position, flying with the opposite gender and age. In all cases, the strengths of association were large. In general, Table 7.20 indicates that the demographic variables are related and cause multicollinearity. The high Phi-values indicate that the independent variables measure approximately the same occurrence (the variance between the variables is small). The large association between the demographic variables influences the effect size.

The results of the test of between-subjects effects for Factor 1 (Flying Proficiency) and Factor 2 (Safety Orientation) are set out in Table 7.21 and Table 7.22 and confirm the association between the variables.

Table 7.21: N-way ANOVA: tests of between-subject effects for Factor 1 (Flying Proficiency)

Source	Type III Sum of squares	df	Mean square	F	Sig.	Partial eta square
Corrected model	87166.255**	43	2027.122	6.138	0.000	0.303
Intercept	444619.837	1	444619.837	1346.226	0.000	0.689
Gender	5450.305	1	5450.305	16.503	0.000	0.026
Education	71.699	3	23.900	0.072	0.975	0.000
Certification	848.996	3	282.999	0.857	0.463	0.004
Position	624.276	2	312.138	0.945	0.389	0.003
Fly with opposite gender	159.209	4	39.802	0.121	0.975	0.001
Age	645.481	3	215.160	0.651	0.582	0.003
Flying time	1101.308	6	183.551	0.556	0.766	0.005
Gender*Education	3071.319	3	1023.773	3.100	0.026	0.015
Gender*Certification	484.734	3	161.578	0.489	0.690	0.002
Gender*Position	451.436	2	225.718	0.683	0.505	0.002
Gender*Fly with opposite gender	894.035	4	223.509	0.677	0.608	0.004

Gender*Age	2569.458	3	856.486	2.593	0.052	0.013
Gender*Flying time	742.795	6	123.799	0.375	0.895	0.004
Error	200804.894	608	330.271	-	-	-
Total	7886972.957	652	-	-	-	-
Corrected Total	287971.148	651	-	-	-	-

* Computed using alpha = 0.05; **R Squared =0.303 (Adjusted R Squared = 0.253)

Table 7.22: N-way ANOVA: tests of between-subject effects for Factor 2 (Safety Orientation)

Source	Type III Sum of squares	df	Mean square	F	Sig.	Partial eta square
Corrected Model	7359.191**	43	171.144	3.282	0.000	0.188
Intercept	49135.564	1	49135.564	942.295	0.000	0.608
Gender	587.805	1	587.805	11.273	0.001	0.018
Education	224.061	3	74.687	1.432	0.232	0.007
Certification	142.498	3	47.499	0.911	0.435	0.004
Position	128.628	2	64.314	1.233	0.292	0.004
Fly with opposite gender	540.798	4	135.200	2.593	0.036	0.017
Age	148.817	3	49.606	0.951	0.415	0.005
Flying time	516.964	6	86.161	1.652	0.130	0.016
Gender*Education	113.378	3	37.793	0.725	0.537	0.004
Gender*Certification	111.589	3	37.196	0.713	0.544	0.004
Gender*Position	179.151	2	89.576	1.718	0.180	0.006
Gender*Fly with opposite gender	446.377	4	111.594	2.140	0.074	0.014

Gender*Age	3.402	3	1.134	0.022	0.996	0.000
Gender*Flying time	197.677	6	32.946	0.632	0.705	0.006
Error	31703.909	608	52.145	-	-	-
Total	959930.515	652	-	-	-	-
Corrected Total	39063.100	651	**-**	**-**	**-**	**-**

* Computed using alpha = 0.05, **R Squared =0.188 (Adjusted R Squared = 0.131)

The above statistics (see Table 7.21 and Table 7.22) suggest that it is gender that has the biggest influence on attitudes, and *not* any of the other groupings. Gender relates statistically significantly with Flying Proficiency (F(1,651)=16.503; p<0,001) and with Safety Orientation (F(1,651)=11.233; p<0,001).

7.8 MULTIPLE ANALYSIS OF VARIANCE (MANOVA)

The Multiple Analysis of Variance (MANOVA) was used in order to determine the main effects of partially independent categorical variables on multiple dependent variables (North Carolina State University, 2002). Based on the analysis of the strengths of association (Phi), four independent variables were selected and tested using the MANOVA. The results for the MANOVA for gender, education level, certification and age are set out below in Tables 7.23 to 7.25.

Table 7.23: Box's M-test of equality of covariance matrices

Box's M	220.500
F	1.028
df1	174.000
df2	7707.592
Sig.	0.385

The Box's M-test for the homogeneity of variance-covariance matrices indicates that the observed covariance matrices of the dependent variables are equal across the groups and that the assumption of equality has not been violated (p (M)>0.05).

Table 7.24: Levene's test of equality of error variances

	F	df1	df2	Sig.
Flying Proficiency	1.134	101	579	0.192
Safety Orientation	1.183	101	579	0.123

Levene's test of equality of error variances tests whether the error variance of the dependent variables (Flying Proficiency and Safety Orientation) is equal across groups. The results indicate that this assumption has not been violated.

The results of the multiple analysis of variance (MANOVA) for the four demographic variables in respect of the respondents' perceptions of gender-related pilot behaviour are presented in Table 7.25.

Table 7.25: Multivariate MANOVA for Factor 1 (Flying Proficiency) and Factor 2 (Safety Orientation)

Effect	Value	F	Sig.	Partial eta square
Intercept				
Pillai's Trace	0.983	18910.162	0.000	0.983
Wilk's Lambda	0.017	18910.162	0.000	0.983
Hotelling's Trace	56.533	18910.162	0.000	0.983
Roy's Largest Root	56.533	18910.162	0.000	0.983
Gender				
Pillai's Trace	0.264	119.699	0.000	0.264
Wilk's Lambda	0.736	119.699	0.000	0.264
Hotelling's Trace	0.358	119.699	0.000	0.264
Roy's Largest Root	0.358	119.699	0.000	0.264
Education				
Pillai's Trace	0.037	4.158	0.000	0.018
Wilk's Lambda	0.963	4.197	0.000	0.018
Hotelling's Trace	0.038	4.209	0.000	0.019
Roy's Largest Root	0.032	7.103	0.000	0.031
Certification				
Pillai's Trace	0.012	1.400	0.211	0.006
Wilk's Lambda	0.988	1.398	0.212	0.006
Hotelling's Trace	0.013	1.396	0.213	0.006
Roy's Largest Root	0.007	1.586	0.192	0.007
Age				
Pillai's Trace	0.028	3.211	0.025	0.014
Wilk's Lambda	0.972	3.211	0.024	0.014
Hotelling's Trace	0.029	3.232	0.024	0.014
Roy's Largest Root	0.026	5.892	0.002	0.026

Design: Intercept + Gender + Education + Certification + Age.

From the results of the MANOVA, it appears that gender is the most important independent variable in the model. The Hotelling Trace is equal to 0.358, with an associated F=119.699, p<0.001. The squared eta of 0.264 indicates that gender explains 26.4% of the variance in the specified model. From the associated ANOVA (Table 7.26), it is apparent that there is a statistically significant difference between the group means with regard to Flying Proficiency (F1) (F(1.681)=140.225; p<0.001) and Safety Orientation (F2) (F(1.681) = 42.882; p<0.001). The mean scores for the female pilots were higher in all cases than with their male counterparts.

The results of the MANOVA for the four different education levels indicate that the effect of education on perceived gender-related pilot behaviour is statistically significant. The Wilk's coefficient lambda, is equal to 0.963, with an associated F=4.197, p<0.001. From the ANOVA (Table 7.26), it is apparent that education only has a significant effect in respect of Safety Orientation (F2) (F(3.681)=7.102; p<0.001). The results of Sheffé's *post hoc* multiple comparisons show that the group with a high school qualification differ from the groups with technical diplomas, bachelor's degrees and post-graduate degrees. The mean score of the high school group was statistically significantly lower.

The result of the MANOVA in respect of pilot certification indicates no difference in the vectors of the means of the four sub-groups. Wilk's Lambda was 0.988. This coefficient was statistically non-significant (F=1.398; p=0.212).

Regarding age, the results of the MANOVA indicate differences between the mean scores of the different age groupings. Wilk's coefficient lambda is equal to 0.972 (F=3.221; p<0.05). From the ANOVA it is apparent that the statistically significant difference in means is only applicable for Safety Orientation (F2) (F(3.681)=5.185; p<0.01). Scheffé's *post hoc* test indicates a significant difference only between the mean scores of pilots younger than 30 years and pilots in the higher age groupings. The perceptions of the age group under 29 years Flying Proficiency and Safety Orientation were significantly lower than the subsets 30-39 years; 40-49 years; and 50-69 years. The other age groups did not differ significantly from each other.

Eta squared (η^2) was calculated to determine the effect size of the independent variables (factors). Cohen's (1988) criteria for the practical significance of effect size was used. He recommends the following guidelines to assess the effect size of η^2: A small effect is 0.01 or 1%, a medium effect is 0.06 or 6%, and a large effect is 0.15 or 15%.

Table 7.26: ANOVA: tests of between-subject effects for Factor 1 (Flying Proficiency) and Factor 2 (Safety Orientation)

Source	Dependent variable	Type III Sum of squares	df	Mean square	F	Sig.	Partial eta square
Corrected Model							
	Flying Proficiency	81682.492*	10	8168.249	24.823	0.000	0.270
	Safety Orientation	5252.580**	10	525.258	10.014	0.000	0.130
Intercept							
	Flying Proficiency	5244240.488	1	5244240.488	15937.057	0.000	0.960
	Safety Orientation	636242.260	1	636242.200	12129.339	0.000	0.948
Gender							
	Flying Proficiency	46142.244	1	46142.249	140.225	**0.000**	0.173
	Safety Orientation	2249.373	1	2249.373	42.882	**0.000**	0.060
Education							
	Flying Proficiency	1749.852	3	583.284	1.773	0.151	0.008
	Safety Orientation	1117.629	3	372.543	7.102	**0.000**	0.031
Certification							
	Flying Proficiency	1463.440	3	487.813	1.482	0.218	0.007
	Safety Orientation	195.951	3	65.317	1.245	0.292	0.006
Age							
	Flying Proficiency	2435.8284	3	811.943	2.467	0.061	0.011
	Safety Orientation	816.0077	3	272.002	5.185	**0.002**	0.023
Error							
	Flying Proficiency	220469.881	670	329.060	-	-	-
	Safety Orientation	35144.725	670	52.455	-	-	-
Total							
	Flying Proficiency	8221681.705	681	-	-	-	-
	Safety Orientation	1000355.515	681	-	-	-	-
Corrected Total							
	Flying Proficiency	302152.373	680	-	-	-	-
	Safety Orientation	40397.305	680	-	-	-	-

*R Squared = 0.279 (Adjusted R Squared = 0.261)
** R Squared = 0.153 (Adjusted R Squared = 0.132)

Table 7.27: A summary of the main effects and effects size of the independent variables on perceptions of gender-related pilot behaviour

Variables/Factors	Eta square	Effect size	
	η^2	%	*Value*
Gender			
F1 Flying Proficiency	0.173	17.3%	Large
F2 Safety Orientation	0.060	6.0%	Medium
F1/F2 Overall	0.264	26.4%	Large
Education			
F1 Flying Proficiency	0.008	0.0%	Zero
F2 Safety Orientation	0.031	3.1%	Small
F1/F2 Overall	0.018	1.8%	Small
Certification			
F1 Flying Proficiency	0.007	0.0%	Zero
F2 Safety Orientation	0.006	0.0%	Zero
F1/F2 Overall	0.006	0.0%	Zero
Age			
F1 Flying Proficiency	0.011	1.1%	Small
F2 Safety Orientation	0.023	2.3%	Small
F1/F2 Overall	0.014	1.4%	Small

According to Table 7.26, **gender** is the primary independent variable that influences pilot perceptions and attitudes towards gender-related pilot behaviour. The effect size of the relationship between education, age and perception of gender issues is very small and the practical implications of this relationship are negligible.

7.9 INTEGRATED CONCLUSION

Initial factor analysis of the Aviation Gender Attitude Questionnaire yielded more factors than was originally expected. However, the eigenvalues suggested that there are only two significant constructs, which the author has categorised as Flying Proficiency (Factor 1) and Safety Orientation (Factor 2). Both factors were subjected to a variety of statistical tests. First, a t-test was used in order to determine whether there are any major differences between the attitudes of male and female pilots. The results of this analysis indicate that female pilots seem to have a more positive view of their Flying Proficiency and Safety Orientation than male pilots do. The practical significance of this analysis was fairly large, indicating major differences between the attitudes of male and female pilots.

ANOVA assessments were conducted in order to determine whether the attitudes of pilots differed due to education level, type of pilot certification, opportunity to fly with the opposite gender, age and flying time. From these analyses it became evident that gender has the biggest influence on attitudes, and not any of the other groupings.

MANOVA was conducted in order to determine the main effects of partially independent categorical variables on multiple dependent variables. The results of the MANOVA for the design 'gender + education + certification + age' once again suggested that the primary independent variable that influences pilots' perceptions and attitudes of Flying Proficiency and Safety Orientation is gender.

Against the background of the above research findings, results are discussed and recommendations are made in Chapter 8.