



Table 2

Descriptive Statistics for All Variables in LOE Alpha (Observable Behaviors), Event Set #1 (Pre-Departure)

Variable	Mean	SD	PIC	SIC	CRM	Technical	Behavior 1	Behavior 2	Behavior 3	Behavior 4	Behavior 5
PIC	3.1009	.4331	1.000								
SIC	3.1364	.4315	.642**	1.000							
CRM	3.1477	.4211	.644**	.664**	1.000						
Technical	3.0597	.4325	.583**	.589**	.608**	1.000					
Behavior 1	2.8693	.3883	.205**	.234**	.231**	.224**	1.000				
Behavior 2	2.9318	.2522	.089**	.138**	.149**	.089**	.417**	1.000			
Behavior 3	2.7940	.4876	.193**	.215**	.218**	.193**	.639**	.302**	1.000		
Behavior 4	2.9645	.1852	.062	.150**	.086**	.009	.291**	.344**	.187**	1.000	
Behavior 5	2.9389	.2396	.183**	.094**	.188**	.186**	.174**	.237**	.123**	.207**	1.000

Note: Listwise N = 352 crews

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

Table 3

Descriptive Statistics for All Variables in LOE Alpha (Observable Behaviors), Event Set #2 (Taxi Out)

Variable	Mean	SD	PIC	SIC	CRM	Technical	Behavior 1	Behavior 2	Behavior 3	Behavior 4
PIC	3.1520	.4429	1.000							
SIC	3.1576	.4345	.666**	1.000						
CRM	3.1980	.4842	.687**	.708**	1.000					
Technical	3.0907	.4889	.639**	.689**	.620**	1.000				
Behavior 1	2.9303	.2549	.119**	.024	.089**	.073*	1.000			
Behavior 2	2.9512	.2156	.019	.082**	.039	.095*	.370**	1.000		
Behavior 3	2.9400	.2376	.113**	.146**	.249**	.119**	.277**	.243**	1.000	
Behavior 4	2.8703	.4341	.045	.175**	.122**	.128**	.057	.186**	.182**	1.000

Note: Listwise N = 358 crews

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

Table 4

Descriptive Statistics for All Variables in LOE Alpha (Observable Behaviors), Event Set #3 (Climb)

Variable	Mean	SD	PIC	SIC	CRM	Technical	Behavior 1	Behavior 2	Behavior 3	Behavior 4
PIC	3.0559	.4093	1.000							
SIC	3.0531	.4361	.516**	1.000						
CRM	3.0978	.4250	.652**	.568**	1.000					
Technical	2.9930	.4861	.614**	.602**	.606**	1.000				
Behavior 1	2.9148	.2892	.253**	.236**	.182**	.314**	1.000			
Behavior 2	2.5573	.6039	.247**	.212**	.136**	.256**	.176**	1.000		
Behavior 3	2.6564	.5066	.309**	.235**	.202**	.337**	.220**	.375**	1.000	
Behavior 4	2.8673	.3672	.254**	.219**	.173**	.269**	.381**	.372**	.303**	1.000

Note: Listwise N = 358 crews

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

Table 5

Descriptive Statistics for All Variables in LOE Alpha (Observable Behaviors), Event Set #4 (Cruise)

Variable	Mean	SD	PIC	SIC	CRM	Technical	Behavior 1	Behavior 2	Behavior 3	Behavior 4	Behavior 5	Behavior 6	Behavior 7
PIC	3.0074	.6078	1.000										
SIC	3.0622	.6227	.736**	1.000									
CRM	3.0207	.6349	.757**	.740**	1.000								
Technical	2.9333	.6187	.712**	.646**	.657**	1.000							
Behavior 1	2.9319	.2637	.244**	.261**	.257**	.245**	1.000						
Behavior 2	2.9141	.3009	.271**	.242**	.343**	.216**	.150**	1.000					
Behavior 3	2.7215	.4867	.403**	.405**	.432**	.411**	.222**	.211**	1.000				
Behavior 4	2.7778	.4568	.401**	.372**	.440**	.310**	.317**	.314**	.435**	1.000			
Behavior 5	2.8267	.4090	.387**	.340**	.397**	.324**	.193**	.421**	.361**	.405**	1.000		
Behavior 6	2.8133	.4085	.274**	.203**	.255**	.274**	.075	.207**	.298**	.366**	.286**	1.000	
Behavior 7	2.8667	.3890	.287**	.285**	.372**	.296**	.229**	.358**	.391**	.342**	.451**	.459**	1.000

Note: Listwise N = 337 crews

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

Table 6

Descriptive Statistics for All Variables in LOE Alpha (Observable Behaviors), Event Set #5 (Descent)

Variable	Mean	SD	PIC	SIC	CRM	Technical	Behavior 1	Behavior 2	Behavior 3	Behavior 4	Behavior 5	Behavior 6
PIC	3.0501	.5011	1.000									
SIC	3.1302	.4923	.647**	1.000								
CRM	3.0944	.5214	.684**	.639**	1.000							
Technical	2.9914	.5134	.564**	.537**	.528**	1.000						
Behavior 1	2.7725	.5417	.221**	.122**	.132**	.230**	1.000					
Behavior 2	2.8770	.3539	.334**	.265**	.343**	.270**	.377**	1.000				
Behavior 3	2.8627	.3527	.290**	.210**	.390**	.160**	.009	.427**	1.000			
Behavior 4	2.8629	.4147	.331**	.195**	.361**	.235**	.041	.235**	.366**	1.000		
Behavior 5	2.7668	.4651	.210**	.183**	.345**	.136**	.017	.339**	.494**	.340**	1.000	
Behavior 6	2.9099	.2964	.301**	.257**	.333**	.164**	.068	.318**	.320**	.397**	.398**	1.000

Note: Listwise N = 350 crews

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

Table 7

Descriptive Statistics for All Variables in LOE Alpha (Observable Behaviors), Event Set #6 (Approach)

Variable	Mean	SD	PIC	SIC	CRM	Technical	Behavior 1	Behavior 2	Behavior 3	Behavior 4	Behavior 5	Behavior 6
PIC	3.0415	.5486	1.000									
SIC	3.1452	.5048	.701**	1.000								
CRM	3.1363	.5073	.630**	.682**	1.000							
Technical	3.0267	.5784	.604**	.561**	.559**	1.000						
Behavior 1	2.8207	.4346	.448**	.322**	.272**	.497**	1.000					
Behavior 2	2.9067	.2962	.207**	.200**	.292**	.309**	.458**	1.000				
Behavior 3	2.8030	.4268	.282**	.298**	.378**	.226**	.369**	.336**	1.000			
Behavior 4	2.9126	.2980	.222**	.262**	.275**	.212**	.360**	.513**	.296**	1.000		
Behavior 5	2.8800	.3386	.266**	.258**	.303**	.274**	.418**	.450**	.370**	.440**	1.000	
Behavior 6	2.8356	.4974	.210**	.107**	.112**	.113**	.186**	.218**	.127**	.123**	.191**	1.000

Note: Listwise N = 337 crews

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

Table 8

Summary Results for the Path Analyses Based on the Six Event Sets in LOE Alpha (Observable Behaviors)

Event Set Title	Number of Observable Behaviors	R <sup>2</sup> CRM	R <sup>2</sup> Technical	R <sup>2</sup> PIC	R <sup>2</sup> SIC
Pre-Departure	5	.085	.084	.473	.495
Taxi-Out	4	.070	.029	.545	.602
Climb	4	.067	.192	.501	.428
Cruise	7	.332	.242	.654	.592
Descent	6	.262	.127	.525	.463
Approach	6	.196	.258	.489	.512
<b>Average R<sup>2</sup></b>		.145	.133	.455	.442

Note: CRM and Technical Performance ratings were regressed onto all observable behaviors simultaneously. PIC and SIC ratings were regressed onto CRM and Technical performance ratings simultaneously.



Table 9

Comparison of the Beta Weights in PIC and SIC Performance Ratings in LOE Alpha (Observable Behaviors)

Event Set Title	PIC			SIC		
	$\beta$ CRM	$\beta$ Technical	Significance	$\beta$ CRM	$\beta$ Technical	Significance
Pre-Departure	.459	.304	$t_{(349)} = 2.034^*$	.485	.294	$t_{(349)} = 2.560^*$
Taxi-Out	.471	.347	$t_{(355)} = 1.647$	.456	.406	$t_{(355)} = .710$
Climb	.443	.345	$t_{(355)} = 1.183$	.321	.408	$t_{(355)} = -.981$
Cruise	.509	.377	$t_{(334)} = 1.870$	.555	.282	$t_{(334)} = 3.561^{**}$
Descent	.535	.282	$t_{(346)} = 3.346^{**}$	.492	.278	$t_{(346)} = 2.662^{**}$
Approach	.425	.367	$t_{(334)} = .724$	.535	.262	$t_{(334)} = 3.489^{**}$
<b>Average <math>\beta</math></b>	<b>.406</b>	<b>.289</b>		<b>.406</b>	<b>.276</b>	

\*\* . t-value is significant at the 0.01 level (1-tailed).

\* . t-value is significant at the 0.05 level (1-tailed).

Table 10

Descriptive Statistics for All Variables in LOE Bravo (Topic-Level Ratings), Event Set #1 (Pre-Departure to Taxi-Out)

Variable	Mean	SD	PIC	SIC	CRM	Technical	Topic 1	Topic 2	Topic 3	Topic 4
PIC	3.2175	.5751	1.000							
SIC	3.1448	.5836	.675**	1.000						
CRM	3.2360	.5519	.750**	.665**	1.000					
Technical	3.0656	.6242	.666**	.556**	.652**	1.000				
Topic 1	2.8469	.4223	.247**	.194**	.234**	.227**	1.000			
Topic 2	2.8262	.4680	.213**	.204**	.230**	.197**	.400**	1.000		
Topic 3	2.3645	.6417	.339**	.383**	.318**	.425**	.300**	.235**	1.000	
Topic 4	2.8299	.4522	.180**	.158**	.200**	.160**	.411**	.590**	.205**	1.000

Note: Listwise N = 823 crews

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

Table 11

Descriptive Statistics for All Variables in LOE Bravo (Topic-Level Ratings), Event Set #2 (Take-Off to Top of Climb)

Variable	Mean	SD	PIC	SIC	CRM	Technical	Topic 1	Topic 2	Topic 3
PIC	3.2578	.5543	1.000						
SIC	3.2400	.5867	.805**	1.000					
CRM	3.2711	.5599	.812**	.769**	1.000				
Technical	3.1663	.5842	.734**	.677**	.706**	1.000			
Topic 1	2.7627	.5058	.257**	.282**	.257**	.296**	1.000		
Topic 2	2.8663	.3991	.199**	.209**	.205**	.209**	.392**	1.000	
Topic 3	2.8627	.4397	.195**	.165**	.195**	.206**	.569**	.541**	1.000

Note: Listwise N = 830 crews

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

Table 12

Descriptive Statistics for All Variables in LOE Bravo (Topic-Level Ratings), Event Set #3 (Top of Climb to FL 280)

Variable	Mean	SD	PIC	SIC	CRM	Technical	Topic 1	Topic 2
PIC	2.8954	.8366	1.000					
SIC	2.8869	.8377	.939**	1.000				
CRM	2.9429	.8239	.895**	.899**	1.000			
Technical	2.8615	.8442	.903**	.875**	.902**	1.000		
Topic 1	2.0571	.8712	.648**	.640**	.636**	.658**	1.000	
Topic 2	2.1154	.8958	.624**	.621**	.615**	.625**	.832**	1.000

Note: Listwise N = 822 crews

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

Table 13

Descriptive Statistics for All Variables in LOE Bravo (Topic-Level Ratings), Event Set #4 (Dangerous Goods Incident)

Variable	Mean	SD	PIC	SIC	CRM	Technical	Topic 1	Topic 2	Topic 3	Topic 4
PIC	3.1119	.7182	1.000							
SIC	3.1644	.6830	.755**	1.000						
CRM	3.1594	.7303	.783**	.729**	1.000					
Technical	3.0657	.6929	.723**	.694**	.688**	1.000				
Topic 1	2.8455	.4673	.182**	.206**	.194**	.170**	1.000			
Topic 2	2.5718	.6155	.420**	.330**	.399**	.368**	.502**	1.000		
Topic 3	2.7871	.5536	.268**	.241**	.319**	.242**	.456**	.568**	1.000	
Topic 4	2.6910	.5489	.338**	.298**	.366**	.283**	.583**	.602**	.528**	1.000

Note: Listwise N = 822 crews

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

Table 14

Descriptive Statistics for All Variables in LOE Bravo (Topic-Level Ratings), Event Set #5 (Top of Descent to Final Approach)

Variable	Mean	SD	PIC	SIC	CRM	Technical	Topic 1	Topic 2	Topic 3	Topic 4
PIC	3.2397	.6479	1.000							
SIC	3.2182	.6295	.811**	1.000						
CRM	3.2627	.6604	.802**	.761**	1.000					
Technical	3.1644	.6467	.804**	.739**	.739**	1.000				
Topic 1	2.7990	.5240	.310**	.306**	.341**	.284**	1.000			
Topic 2	2.7833	.5394	.298**	.261**	.251**	.279**	.613**	1.000		
Topic 3	2.7688	.5578	.291**	.279**	.290**	.274**	.624**	.747**	1.000	
Topic 4	2.7530	.5757	.289**	.273**	.272**	.223**	.707**	.697**	.708**	1.000

Note: Listwise N = 826 crews

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

Table 15

Descriptive Statistics for All Variables in LOE Bravo (Topic-Level Ratings), Event Set #6 (Final Approach to Taxi In)

Variable	Mean	SD	PIC	SIC	CRM	Technical	Topic 1	Topic 2	Topic 3
PIC	3.2085	.7172	1.000						
SIC	3.1952	.7201	.862**	1.000					
CRM	3.2446	.7001	.864**	.850**	1.000				
Technical	3.1634	.7292	.825**	.815**	.857**	1.000			
Topic 1	2.7494	.5794	.461**	.438**	.417**	.422**	1.000		
Topic 2	2.8245	.5062	.388**	.368**	.381**	.348**	.746**	1.000	
Topic 3	2.8390	.4868	.363**	.354**	.375**	.341**	.694**	.809**	1.000

Note: Listwise N = 825 crews

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

Table 16

Summary Results for the Path Analyses Based on the Six Event Sets in LOE Bravo (Topic-Level Ratings)

Event Set Title	Number of Topics	R <sup>2</sup> CRM	R <sup>2</sup> Technical	R <sup>2</sup> PIC	R <sup>2</sup> SIC
Pre-Departure to Taxi Out	4	.137	.197	.614	.468
Take-Off to Top of Climb	3	.079	.098	.711	.627
Top of Climb to FL 280	2	.428	.453	.848	.830
Dangerous Goods Incident	4	.196	.145	.677	.602
Top of Descent to Final Approach	4	.126	.104	.742	.648
Final Approach to Taxi-In	3	.190	.185	.774	.750
<b>Average R<sup>2</sup></b>		<b>.165</b>	<b>.169</b>	<b>.624</b>	<b>.561</b>

Note: CRM and Technical Performance ratings were regressed onto all topic-level ratings simultaneously. PIC and SIC ratings were regressed onto CRM and Technical performance ratings simultaneously.



Table 17

Comparison of the Beta Weights in PIC and SIC Performance Ratings in LOE Bravo (Topic-Level Ratings)

Event Set Title	PIC			SIC		
	$\beta$ CRM	$\beta$ Technical	Significance	$\beta$ CRM	$\beta$ Technical	Significance
Pre-Departure to Taxi Out	.549	.306	$t_{(820)} = 4.645^{***}$	.526	.213	$t_{(820)} = 5.094^{***}$
Take-Off to Top of Climb	.583	.323	$t_{(827)} = 5.355^{***}$	.580	.267	$t_{(827)} = 5.649^{***}$
Top of Climb to FL 280	.433	.511	$t_{(819)} = -1.267$	.591	.342	$t_{(819)} = 3.824^{***}$
Dangerous Goods Incident	.544	.348	$t_{(819)} = 3.933^{***}$	.478	.365	$t_{(819)} = 2.041^*$
Top of Descent to Final Approach	.456	.468	$t_{(823)} = -.246$	.474	.389	$t_{(822)} = 1.491$
Final Approach to Taxi-In	.590	.320	$t_{(822)} = 4.381^{***}$	.565	.331	$t_{(822)} = 3.610^{***}$
<b>Average <math>\beta</math></b>	<b>.451</b>	<b>.325</b>		<b>.459</b>	<b>.272</b>	

\*\*. t-value is significant at the 0.01 level (1-tailed).

\*. t-value is significant at the 0.05 level (1-tailed).