

Stairs, Escalators, and Obesity

```
HILOGLINEAR
  weight(1 3) direct(1 2) device(1 2)
  /CRITERIA ITERATION(20) DELTA(0)
  /PRINT=ASSOCIATION ESTIM
  /DESIGN .
```

Note - I have deleted some tables, some rows, some columns, etc.

Hierarchical Loglinear Analysis

Design 1

Goodness-of-Fit Tests

	Chi-Square	df	Sig.
Likelihood Ratio	.000	0	.
Pearson	.000	0	.

K-Way and Higher-Order Effects

	K	df	Likelihood Ratio		Pearson
			Chi-Square	Sig.	Chi-Square
K-way and Higher Order Effects ^a	1	11	3418.246	.000	3738.789
	2	7	270.374	.000	276.207
	3	2	12.977	.002	12.225
K-way Effects ^b	1	4	3147.872	.000	3462.581
	2	5	257.397	.000	263.982
	3	2	12.977	.002	12.225

Partial Associations

Effect	df	Partial Chi-Square	Sig.	Number of Iterations
weight*direct	2	25.627	.000	2
weight*device	2	6.115	.047	2
direct*device	1	211.380	.000	2
weight	2	1198.241	.000	2
direct	1	75.850	.000	2
device	1	1873.781	.000	2

Parameter Estimates

Effect	Parameter	Estimate	Std. Error	Z	Sig.
weight*direct*device	1	.084	.076	1.106	.269
	2	-.160	.055	-2.900	.004
weight*direct	1	.241	.076	3.171	.002
	2	-.283	.055	-5.129	.000
weight*device	1	-.142	.076	-1.863	.063
	2	.014	.055	.257	.798
direct*device	1	-.400	.043	-9.310	.000
weight	1	-1.148	.076	-15.098	.000
	2	.253	.055	4.584	.000
direct	1	-.093	.043	-2.164	.030
device	1	-1.052	.043	-24.470	.000

```

LOGLINEAR WEIGHT(1,3) DIRECT(1,2) DEVICE(1,2) /
PRINT=DEFAULT ESTIM /
DESIGN=WEIGHT DIRECT DEVICE WEIGHT BY DIRECT DIRECT BY DEVICE MODEL 1: Saturated model less Weight x Device
WEIGHT BY DIRECT BY DEVICE /
DESIGN=WEIGHT DEVICE WEIGHT BY DIRECT WEIGHT BY DEVICE MODEL 2: Saturated model less Direct
DIRECT BY DEVICE WEIGHT BY DIRECT BY DEVICE .

```

Loglinear

Because this output is so wide, I had to set the margins to .5 and switch to landscape mode so it would fit on the page.

C:\D\SPSS\Escalate.sav

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* * * * * LOG LINEAR ANALYSIS * * * * *

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DATA Information

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12 unweighted cases accepted.
0 cases rejected because of out-of-range factor values.
0 cases rejected because of missing data.
3217 weighted cases will be used in the analysis.

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FACTOR Information

Factor	Level	Label
weight	3	
direct	2	
device	2	

DESIGN Information

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2 Designs/Models will be processed.

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* * * * * LOG LINEAR ANALYSIS * * * * *

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Model 1 – Weight By Device removed from full model.

Correspondence Between Effects and Columns of Design/Model 1

Starting Column	Ending Column	Effect Name
1	2	WEIGHT
3	3	DIRECT
4	4	DEVICE
5	6	WEIGHT BY DIRECT
7	7	DIRECT BY DEVICE
8	9	WEIGHT BY DIRECT BY DEVICE

*** ML converged at iteration 3.

Maximum difference between successive iterations = .00054.

Observed, Expected Frequencies and Residuals

Factor	Code	OBS. count & PCT.	EXP. count & PCT.	Residual	Std. Resid.	Adj. Resid.
weight	Obese					
direct	Ascendin					
device	Stairs	10.00 (.31)	15.45 (.48)	-5.4532	-1.3872	-2.1111
device	Escalato	205.00 (6.37)	199.55 (6.20)	5.4532	.3860	2.1111
direct	Descendi					
device	Stairs	14.00 (.44)	19.45 (.60)	-5.4532	-1.2364	-2.1111
device	Escalato	81.00 (2.52)	75.55 (2.35)	5.4532	.6274	2.1111
weight	Overweig					
direct	Ascendin					
device	Stairs	22.00 (.68)	26.50 (.82)	-4.5049	-.8750	-1.1791
device	Escalato	538.00 (16.72)	533.50 (16.58)	4.5049	.1950	1.1791
direct	Descendi					
device	Stairs	143.00 (4.45)	147.50 (4.59)	-4.5049	-.3709	-1.1791
device	Escalato	372.00 (11.56)	367.50 (11.42)	4.5049	.2350	1.1791
weight	Normal					
direct	Ascendin					
device	Stairs	82.00 (2.55)	72.04 (2.24)	9.9581	1.1732	2.4113
device	Escalato	998.00 (31.02)	1007.96 (31.33)	-9.9581	-.3137	-2.4113
direct	Descendi					
device	Stairs	174.00 (5.41)	164.04 (5.10)	9.9581	.7775	2.4113
device	Escalato	578.00 (17.97)	587.96 (18.28)	-9.9581	-.4107	-2.4113

Goodness-of-Fit test statistics

Likelihood Ratio Chi Square = 7.65286 DF = 2 P = .022
 Pearson Chi Square = 7.24027 DF = 2 P = .027

Reduced Model Does Not Fit Data Well

Estimates for Parameters

WEIGHT

Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 CI	Upper 95 CI
1	-1.0394827507	.04399	-23.62955	-1.12570	-.95326
2	.2431969218	.03112	7.81441	.18220	.30420

DIRECT

Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 CI	Upper 95 CI
3	-.0738781514	.03711	-1.99055	-.14662	-.00113

DEVICE

Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 CI	Upper 95 CI
4	-.9787421496	.02948	-33.20094	-1.03652	-.92096

WEIGHT BY DIRECT

Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 CI	Upper 95 CI
5	.2591536332	.06338	4.08869	.13492	.38338
6	-.2620697680	.04350	-6.02446	-.34733	-.17681

DIRECT BY DEVICE

Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 CI	Upper 95 CI
7	-.3877219520	.03710	-10.45139	-.46043	-.31501

WEIGHT BY DIRECT BY DEVICE

Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 CI	Upper 95 CI
8	.0873490671	.06443	1.35565	-.03894	.21364

9 -.1345959193 .04471 -3.01015 -.22224 -.04696

 * * * * * L O G L I N E A R A N A L Y S I S * * * * *

Correspondence Between Effects and Columns of Design/ **Model 2**

Starting Column	Ending Column	Effect Name
1	2	WEIGHT
3	3	DEVICE
4	5	WEIGHT BY DIRECT
6	7	WEIGHT BY DEVICE
8	8	DIRECT BY DEVICE
9	10	WEIGHT BY DIRECT BY DEVICE

Weight by Device back in, Direction removed.

 *** ML converged at iteration 4.
 Maximum difference between successive iterations = .00001.

Observed, Expected Frequencies and Residuals

Factor	Code	OBS. count & PCT.	EXP. count & PCT.	Residual	Std. Resid.	Adj. Resid.
weight	Obese					
direct	Ascendin					
device	Stairs	10.00 (.31)	14.30 (.44)	-4.3017	-1.1375	-2.1971
device	Escalato	205.00 (6.37)	209.30 (6.51)	-4.3017	-.2973	-2.1971
direct	Descendi					
device	Stairs	14.00 (.44)	9.70 (.30)	4.3017	1.3813	2.1971
device	Escalato	81.00 (2.52)	76.70 (2.38)	4.3017	.4912	2.1971
weight	Overweig					
direct	Ascendin					
device	Stairs	22.00 (.68)	26.30 (.82)	-4.3017	-.8388	-2.1971
device	Escalato	538.00 (16.72)	542.30 (16.86)	-4.3017	-.1847	-2.1971
direct	Descendi					
device	Stairs	143.00 (4.45)	138.70 (4.31)	4.3017	.3653	2.1971
device	Escalato	372.00 (11.56)	367.70 (11.43)	4.3017	.2243	2.1971

weight	Normal					
direct	Ascendin					
device	Stairs	82.00 (2.55)	86.30 (2.68)	-4.3017	-.4631	-2.1971
device	Escalato	998.00 (31.02)	1002.30 (31.16)	-4.3017	-.1359	-2.1971
direct	Descendi					
device	Stairs	174.00 (5.41)	169.70 (5.28)	4.3017	.3302	2.1971
device	Escalato	578.00 (17.97)	573.70 (17.83)	4.3017	.1796	2.1971

Goodness-of-Fit test statistics

Likelihood Ratio Chi Square = 4.78773 DF = 1 P = .029
 Pearson Chi Square = 4.82722 DF = 1 P = .028

Reduced Model Does Not Fit Data Well

Estimates for Parameters

WEIGHT

Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 CI	Upper 95 CI
1	-1.1689234103	.07361	-15.88022	-1.31320	-1.02465
2	.2783355726	.05101	5.45684	.17836	.37831

DEVICE

Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 CI	Upper 95 CI
3	-1.0352303467	.04251	-24.35388	-1.11855	-.95192

WEIGHT BY DIRECT

Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 CI	Upper 95 CI
4	.3480821546	.05658	6.15190	.23718	.45898
5	-.3185267072	.05018	-6.34763	-.41688	-.22017

WEIGHT BY DEVICE

Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 CI	Upper 95 CI
6	-.1526015892	.07471	-2.04260	-.29903	-.00617
7	.0349428448	.05168	.67618	-.06634	.13623

DIRECT BY DEVICE

Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 CI	Upper 95 CI
8	-.3250680154	.02511	-12.94495	-.37429	-.27585

WEIGHT BY DIRECT BY DEVICE

Parameter	Coeff.	Std. Err.	Z-Value	Lower 95 CI	Upper 95 CI
9	.1712013975	.06369	2.68813	.04637	.29603
10	-.1877385968	.05138	-3.65397	-.28844	-.08704

```

CROSSTABS VARIABLES=WEIGHT (1,3) DIRECT(1,2) DEVICE(1,2)
  /TABLE=WEIGHT BY DEVICE BY DIRECT
  /cells=count row / statistics=chisq .

```

Crosstabs: Direction x Device is significant going up and going down.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
weight * device * direct	3217 ^a	100.0%	0	.0%	3217	100.0%

weight * device * direct Crosstabulation

				device		Total	
				Stairs	Escalator		
direct	Ascending	weight	Obese	Count	10	205	215
				% within weight	4.7%	95.3%	100.0%
	Overweight		Count	22	538	560	
			% within weight	3.9%	96.1%	100.0%	

		Normal	Count	82	998	1080
			% within weight	7.6%	92.4%	100.0%
	Total		Count	114	1741	1855
			% within weight	6.1%	93.9%	100.0%
Descending	weight	Obese	Count	14	81	95
			% within weight	14.7%	85.3%	100.0%
		Overweight	Count	143	372	515
			% within weight	27.8%	72.2%	100.0%
		Normal	Count	174	578	752
			% within weight	23.1%	76.9%	100.0%
	Total		Count	331	1031	1362
			% within weight	24.3%	75.7%	100.0%

Chi-Square Tests

direct		Value	df	Asymp. Sig. (2-sided)
Ascending	Pearson Chi-Square	9.525 ^a	2	.009
	Likelihood Ratio	10.001	2	.007
	Linear-by-Linear Association	6.899	1	.009
	N of Valid Cases	1855		
Descending	Pearson Chi-Square	8.639 ^b	2	.013
	Likelihood Ratio	9.091	2	.011
	Linear-by-Linear Association	.001	1	.973
	N of Valid Cases	1362		

```

CROSSTABS VARIABLES=WEIGHT(1,2) DEVICE(1,2) DIRECT(1,2)
  / TABLES=WEIGHT BY DEVICE BY DIRECT
  / FORMAT=NOTABLES / statistics=chisq .

```

Crosstabs: Obese (1) versus Overweight (2): Not significant going up. Going down the overweight are significantly more likely than the obese to use the stairs.

Chi-Square Tests

direct		Value	df	Asymp. Sig. (2-sided)
Ascending	Pearson Chi-Square	.205 ^a	1	.651
	Continuity Correction ^b	.063	1	.802
	Likelihood Ratio	.200	1	.655
	Fisher's Exact Test			
	Linear-by-Linear Association	.205	1	.651
	N of Valid Cases	775		
Descending	Pearson Chi-Square	7.125 ^c	1	.008
	Continuity Correction ^b	6.459	1	.011
	Likelihood Ratio	7.857	1	.005
	Fisher's Exact Test			
	Linear-by-Linear Association	7.113	1	.008
	N of Valid Cases	610		

TEMPORARY .
MISSING VALUES WEIGHT (2) .
CROSSTABS VARIABLES=WEIGHT (1,3) DEVICE(1,2) DIRECT(1,2)
/ TABLES=WEIGHT BY DEVICE BY DIRECT
/FORMAT=NOTABLES / statistics=chisq .

Crosstabs: Obese (1) versus Normal (3): Not significant in either direction, but close going down.

Chi-Square Tests

direct		Value	df	Asymp. Sig. (2-sided)
Ascending	Pearson Chi-Square	2.351 ^a	1	.125
	Continuity Correction ^b	1.926	1	.165
	Likelihood Ratio	2.597	1	.107
	Fisher's Exact Test			
	Linear-by-Linear Association	2.349	1	.125
	N of Valid Cases	1295		
	Descending	Pearson Chi-Square	3.447 ^c	1
Continuity Correction ^b		2.978	1	.084
Likelihood Ratio		3.746	1	.053
Fisher's Exact Test				
Linear-by-Linear Association		3.443	1	.064
N of Valid Cases		847		

```

CROSSTABS VARIABLES=WEIGHT(2,3) DEVICE(1,2) DIRECT(1,2)
/ TABLES=WEIGHT BY DEVICE BY DIRECT
/ FORMAT=NOTABLES / statistics=chisq .

```

Crosstabs: Overweight (2) versus Normal (3): Overweight significantly more likely to use the stairs than are normal weight people when going down, almost significantly less likely when going up.

Chi-Square Tests

direct		Value	df	Asymp. Sig. (2-sided)
Ascending	Pearson Chi-Square	8.336 ^a	1	.004
	Continuity Correction ^b	7.730	1	.005
	Likelihood Ratio	8.988	1	.003
	Fisher's Exact Test			
	Linear-by-Linear Association	8.331	1	.004
	N of Valid Cases	1640		
Descending	Pearson Chi-Square	3.491 ^c	1	.062
	Continuity Correction ^b	3.249	1	.071
	Likelihood Ratio	3.468	1	.063
	Fisher's Exact Test			
	Linear-by-Linear Association	3.488	1	.062
	N of Valid Cases	1267		