MANOVA

COM 631/731

Spring 2017

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I.   MODEL

From Jeffres & Neuendorf (2015) Film and TV Usage National Survey

INDEPENDENT VARIABLES   DEPENDENT VARIABLES

X1: "GENDER" ⟶

| Q23a. I often watch a favorite film again and again. |
| Q23d. I don't like to watch films at home that I've seen before in a theater. |

X2: Q7. "How did you watch this movie 1" ⟹

| Q23f. I watch TV programs with my family that we've seen before, often several times. |

INTERACTION OF X1 AND X2: ⟶

| Q23l. I like playing/listening to a movie I'm familiar with as background while I do other things. |

Independent Variables:

Q7. How did you watch this movie 1? – Nominal (4 Categories)
        1 = In a theater, 2 = On TV/cable, 3= DVD/Blu-ray, 4 = Online

Gender - Nominal (2 Categories)
        1= Male, 2= Female

Dependent Variables:

(all measured on a 1-7 response scale, where 1=not like me at all and 7=very much like me)

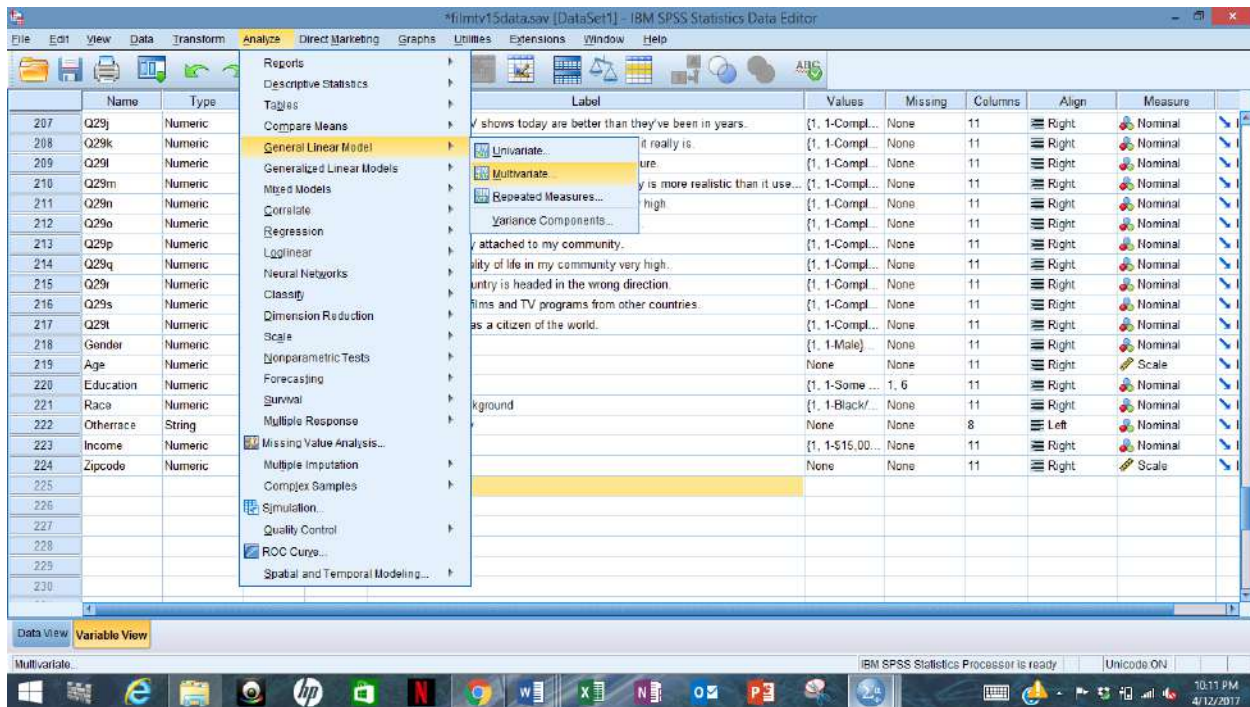Q23a. I often watch a favorite film again and again.

Q23d. I don't like to watch films at home that I've seen before in a theater.

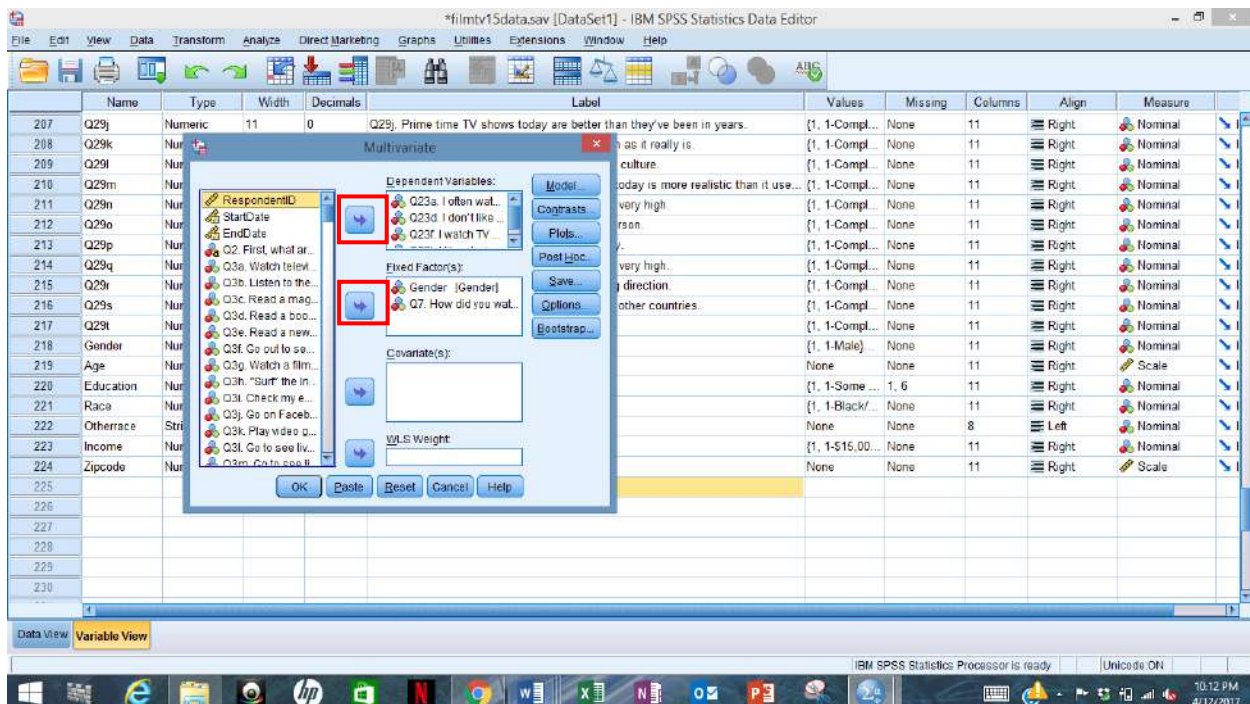Q23f. I watch TV programs with my family that we've seen before, often several times.

Q23l. I like playing/listening to a movie I'm familiar with as background while I do other things.
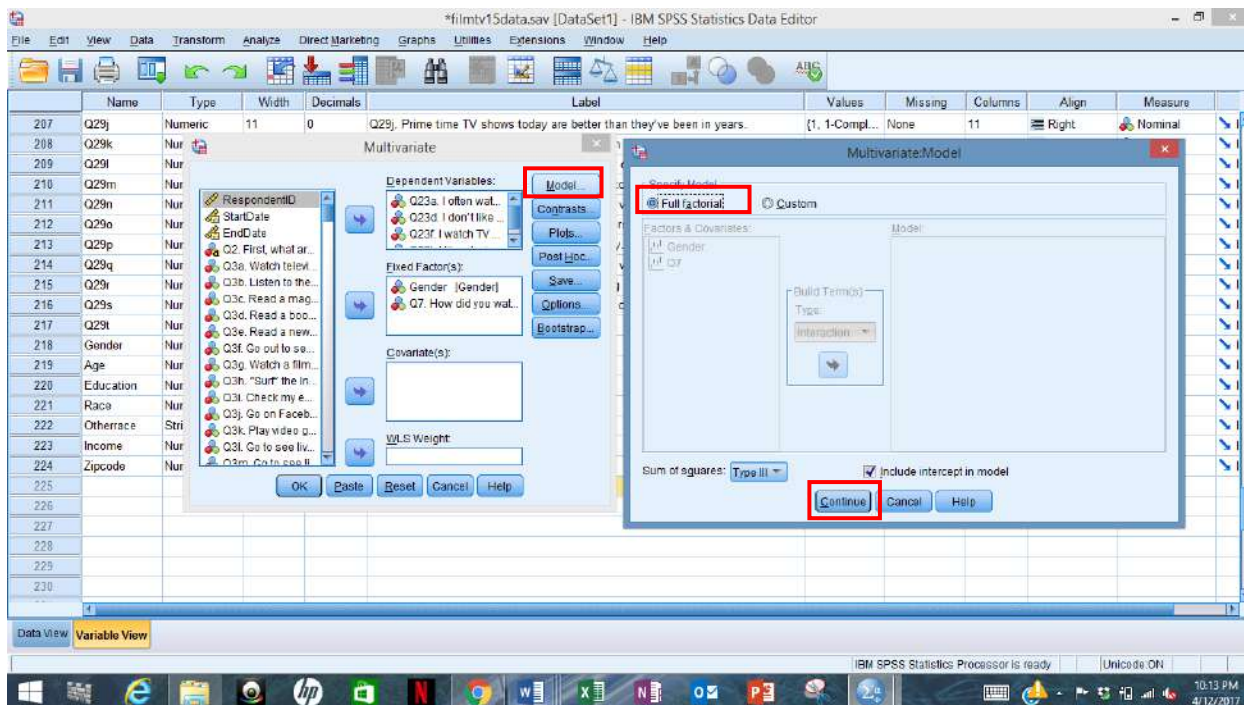
II.   RUNNING SPSS

ANALYZE > GENERAL LINEAR MODEL > MULTIVARIATE

> ADD DEPENDENT AND ("FIXED FACTOR") INDEPENDENT VARIABLES BY CLICKING THE ARROW
(from left boxes to right boxes)

MODEL > √ FULL FACTORIAL > CONTINUE

PLOTS > FACTORS > MOVE IV'S INTO RIGHT BOXES USING ARROW KEYS

> √ HORIZONTAL AXIS

> √ SEPARATE LINES
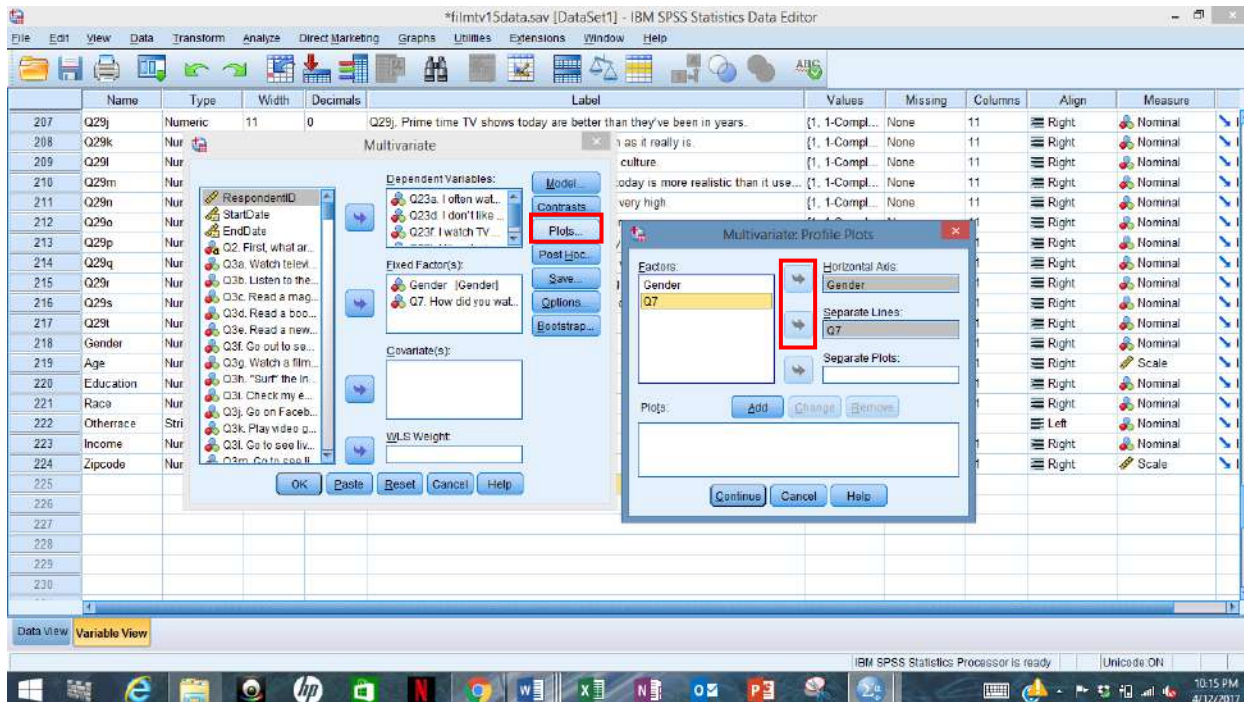
> ONCE IV'S ARE IN THE BOXES, √ ADD TO CREATE A GRAPH SHOWING THE INTERACTION OF THE IVS

> MAKE SURE THE INTERACTION SHOWS IN THE PLOTS BOX AND THEN CLICK CONTINUE

>POST HOC > MOVE OVER EDUCATION (Not gender because it has only two groups)

      EQUAL VARIANCES ASSUMED

         √ SCHEFFE

         √ TUKEY'S-b

         √ ANY OTHER POST HOC TESTS YOU WISH

> CONTINUE

> OPTIONS

> HIGHLIGHT ALL IVs AND THE INTERACTION IN THE LEFT

√ ARROW TO MOVE IVs TO THE RIGHT BOX

DISPLAY

√ DESCRIPTIVE STATISTICS
√ ESTIMATES OF EFFECT SIZE
√ OBSERVED POWER
√ HOMOGENEITY TESTS

> CONTINUE

> CLICK OK TO RUN MANOVA!!! (OR PASTE TO SAVE SYNTAX AND THEN RUN)

III.   SPSS OUTPUT

```
CORRELATIONS
  /VARIABLES=Q23a Q23d Q23f Q23l
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Correlations

Correlations		Q23a. I often watch a favorite film again and again.	Q23d. I don't like to watch films at home that I've seen before in a theater.	Q23f. I watch TV programs with my family that we've seen before, often several times.	Q23l. I like playing/listening to a movie I'm familiar with as background while I do other things.
Q23a. I often watch a favorite film again and again.	Pearson Correlation	1	-.411**	.326**	.369**
	Sig. (2-tailed)		.000	.000	.000
	N	367	367	367	367
Q23d. I don't like to watch films at home that I've seen before in a theater.	Pearson Correlation	-.411**	1	-.189**	-.191**
	Sig. (2-tailed)	.000		.000	.000
	N	367	367	367	367
Q23f. I watch TV programs with my family that we've seen before, often several times.	Pearson Correlation	.326**	-.189**	1	.355**
	Sig. (2-tailed)	.000	.000		.000
	N	367	367	367	367
Q23l. I like playing/listening to a movie I'm familiar with as background while I do other things.	Pearson Correlation	.369**	-.191**	.355**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	367	367	367	367

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

```
GLM Q23a Q23d Q23f Q23l BY Gender Q7
  /METHOD=SSTYPE(3)
  /INTERCEPT=INCLUDE
  /POSTHOC=Q7(BTUKEY SCHEFFE)
  /PLOT=PROFILE(Gender*Q7)
  /EMMEANS=TABLES(Gender)
  /EMMEANS=TABLES(Q7)
  /EMMEANS=TABLES(Gender*Q7)
  /PRINT=DESCRIPTIVE ETASQ OPOWER HOMOGENEITY
  /CRITERIA=ALPHA(.05)
  /DESIGN= Gender Q7 Gender*Q7.
```

- - - - - - - - - - - - - General Linear Model - - - - - - - - - - - - - -

Between-Subjects Factors

		Value Label	N
Gender	1	1-Male	141
	2	2-Female	222
Q7. How did you watch this movie 1	1	1-In theater	85
	2	2-On TV/cable	84
	3	3-DVD or BluRay	90
	4	4-Online	104

Descriptive Statistics

	Gender	Q7. How did you watch this movie 1	Mean	Std. Deviation	N
Q23a. I often watch a favorite film again and again.	1-Male	1-In theater	4.29	1.954	42
		2-On TV/cable	5.58	1.539	19
		3-DVD or BluRay	4.85	1.955	33
		4-Online	4.74	1.916	47
		Total	4.74	1.914	141
	2-Female	1-In theater	4.81	1.955	43
		2-On TV/cable	5.52	1.640	65
		3-DVD or BluRay	5.70	1.546	57
		4-Online	5.12	1.937	57
		Total	5.33	1.781	222
	Total	1-In theater	4.55	1.961	85
		2-On TV/cable	5.54	1.609	84
		3-DVD or BluRay	5.39	1.746	90
		4-Online	4.95	1.928	104
		Total	5.10	1.853	363
Q23d. I don't like to watch films at home that I've seen before in a theater.	1-Male	1-In theater	3.07	1.772	42
		2-On TV/cable	2.05	1.433	19
		3-DVD or BluRay	2.70	1.928	33
		4-Online	3.28	2.018	47
		Total	2.91	1.880	141
	2-Female	1-In theater	2.95	2.138	43
		2-On TV/cable	2.06	1.657	65
		3-DVD or BluRay	2.32	1.947	57
		4-Online	2.25	1.562	57
		Total	2.35	1.828	222
	Total	1-In theater	3.01	1.955	85
		2-On TV/cable	2.06	1.601	84
		3-DVD or BluRay	2.46	1.938	90
		4-Online	2.71	1.847	104
		Total	2.57	1.866	363

Q23f. I watch TV programs with my family that we've seen before, often several times.	1-Male	1-In theater	3.48	1.941	42
		2-On TV/cable	4.32	1.916	19
		3-DVD or BluRay	3.73	1.842	33
		4-Online	2.81	1.569	47
		Total	3.43	1.849	141
	2-Female	1-In theater	3.86	2.088	43
		2-On TV/cable	4.32	1.937	65
		3-DVD or BluRay	4.58	1.963	57
		4-Online	4.14	1.959	57
		Total	4.25	1.982	222
	Total	1-In theater	3.67	2.014	85
		2-On TV/cable	4.32	1.921	84
		3-DVD or BluRay	4.27	1.953	90
		4-Online	3.54	1.905	104
		Total	3.93	1.970	363
Q23l. I like playing/listening to a movie I'm familiar with as background while I do other things.	1-Male	1-In theater	3.76	1.948	42
		2-On TV/cable	4.42	2.009	19
		3-DVD or BluRay	3.27	2.020	33
		4-Online	3.98	2.212	47
		Total	3.81	2.073	141
	2-Female	1-In theater	4.07	2.374	43
		2-On TV/cable	4.75	2.243	65
		3-DVD or BluRay	4.77	2.105	57
		4-Online	4.12	2.330	57
		Total	4.46	2.266	222
	Total	1-In theater	3.92	2.167	85
		2-On TV/cable	4.68	2.185	84
		3-DVD or BluRay	4.22	2.187	90
		4-Online	4.06	2.268	104
		Total	4.21	2.214	363

Box's Test of Equality of Covariance Matrices[a]	
Box's M	122.453
F	1.674
df1	70
df2	68591.989
Sig.	.000

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.

a. Design: Intercept + Gender + Q7 + Gender * Q7

Multivariate Tests[a]									
Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[d]
Intercept	Pillai's Trace	.940	1375.630[b]	4.000	352.000	.000	.940	5502.520	1.000
	Wilks' Lambda	.060	1375.630[b]	4.000	352.000	.000	.940	5502.520	1.000
	Hotelling's Trace	15.632	1375.630[b]	4.000	352.000	.000	.940	5502.520	1.000
	Roy's Largest Root	15.632	1375.630[b]	4.000	352.000	.000	.940	5502.520	1.000
Gender	Pillai's Trace	.035	3.204[b]	4.000	352.000	.013	.035	12.816	.825
	Wilks' Lambda	.965	3.204[b]	4.000	352.000	.013	.035	12.816	.825
	Hotelling's Trace	.036	3.204[b]	4.000	352.000	.013	.035	12.816	.825
	Roy's Largest Root	.036	3.204[b]	4.000	352.000	.013	.035	12.816	.825
Q7	Pillai's Trace	.069	2.073	12.000	1062.000	.016	.023	24.877	.938
	Wilks' Lambda	.932	2.087	12.000	931.596	.016	.023	22.052	.900
	Hotelling's Trace	.072	2.097	12.000	1052.000	.015	.023	25.164	.941
	Roy's Largest Root	.056	4.938[c]	4.000	354.000	.001	.053	19.752	.959
Gender * Q7	Pillai's Trace	.049	1.483	12.000	1062.000	.124	.016	17.799	.808
	Wilks' Lambda	.951	1.485	12.000	931.596	.124	.017	15.698	.743
	Hotelling's Trace	.051	1.485	12.000	1052.000	.123	.017	17.822	.809
	Roy's Largest Root	.035	3.132[c]	4.000	354.000	.015	.034	12.530	.816

a. Design: Intercept + Gender + Q7 + Gender * Q7

b. Exact statistic

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

d. Computed using alpha = .05

Levene's Test of Equality of Error Variances[a]

	F	df1	df2	Sig.
Q23a. I often watch a favorite film again and again.	1.320	7	355	.239
Q23d. I don't like to watch films at home that I've seen before in a theater.	2.836	7	355	.007
Q23f. I watch TV programs with my family that we've seen before, often several times.	1.095	7	355	.366
Q23l. I like playing/listening to a movie I'm familiar with as background while I do other things.	1.407	7	355	.201

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + Gender + Q7 + Gender * Q7

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[e]
Corrected Model	Q23a. I often watch a favorite film again and again.	76.050[a]	7	10.864	3.304	.002	.061	23.131	.958
	Q23d. I don't like to watch films at home that I've seen before in a theater.	72.451[b]	7	10.350	3.091	.004	.057	21.638	.943
	Q23f. I watch TV programs with my family that we've seen before, often several times.	108.725[c]	7	15.532	4.253	.000	.077	29.769	.990
	Q23l. I like playing/listening to a movie I'm familiar with as background while I do other things.	79.286[d]	7	11.327	2.372	.022	.045	16.607	.856
Intercept	Q23a. I often watch a favorite film again and again.	8178.173	1	8178.173	2487.409	.000	.875	2487.409	1.000
	Q23d. I don't like to watch films at home that I've seen before in a theater.	2118.557	1	2118.557	632.727	.000	.641	632.727	1.000
	Q23f. I watch TV programs with my family that we've seen before, often several times.	4834.478	1	4834.478	1323.694	.000	.789	1323.694	1.000
	Q23l. I like playing/listening to a movie I'm familiar with as background while I do other things.	5447.889	1	5447.889	1141.136	.000	.763	1141.136	1.000
Gender	Q23a. I often watch a favorite film again and again.	14.388	1	14.388	4.376	.037	.012	4.376	.550
	Q23d. I don't like to watch films at home that I've seen before in a theater.	11.470	1	11.470	3.426	.065	.010	3.426	.455
	Q23f. I watch TV programs with my family that we've seen before, often several times.	32.868	1	32.868	8.999	.003	.025	8.999	.849
	Q23l. I like playing/listening to a movie I'm familiar with as background while I do other things.	25.856	1	25.856	5.416	.021	.015	5.416	.641
Q7	Q23a. I often watch a favorite film again and again.	41.536	3	13.845	4.211	.006	.034	12.633	.856
	Q23d. I don't like to watch films at home that I've seen before in a theater.	34.771	3	11.590	3.462	.017	.028	10.385	.773
	Q23f. I watch TV programs with my family that we've seen before, often several times.	37.975	3	12.658	3.466	.016	.028	10.398	.774
	Q23l. I like playing/listening to a movie I'm familiar with as background while I do other things.	17.604	3	5.868	1.229	.299	.010	3.687	.329

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power
Gender * Q7	Q23a. I often watch a favorite film again and again.	7.417	3	2.472	.752	.522	.006	2.256	.211
	Q23d. I don't like to watch films at home that I've seen before in a theater.	14.232	3	4.744	1.417	.238	.012	4.251	.376
	Q23f. I watch TV programs with my family that we've seen before, often several times.	19.859	3	6.620	1.812	.145	.015	5.437	.470
	Q23l. I like playing/listening to a movie I'm familiar with as background while I do other things.	25.001	3	8.334	1.746	.157	.015	5.237	.455
Error	Q23a. I often watch a favorite film again and again.	1167.179	355	3.288					
	Q23d. I don't like to watch films at home that I've seen before in a theater.	1188.645	355	3.348					
	Q23f. I watch TV programs with my family that we've seen before, often several times.	1296.554	355	3.652					
	Q23l. I like playing/listening to a movie I'm familiar with as background while I do other things.	1694.802	355	4.774					
Total	Q23a. I often watch a favorite film again and again.	10692.000	363						
	Q23d. I don't like to watch films at home that I've seen before in a theater.	3654.000	363						
	Q23f. I watch TV programs with my family that we've seen before, often several times.	7015.000	363						
	Q23l. I like playing/listening to a movie I'm familiar with as background while I do other things.	8206.000	363						
Corrected Total	Q23a. I often watch a favorite film again and again.	1243.229	362						
	Q23d. I don't like to watch films at home that I've seen before in a theater.	1261.096	362						
	Q23f. I watch TV programs with my family that we've seen before, often several times.	1405.278	362						
	Q23l. I like playing/listening to a movie I'm familiar with as background while I do other things.	1774.088	362						

a. R Squared = .061 (Adjusted R Squared = .043)

b. R Squared = .057 (Adjusted R Squared = .039)

c. R Squared = .077 (Adjusted R Squared = .059)

d. R Squared = .045 (Adjusted R Squared = .026)

e. Computed using alpha = .05

Estimated Marginal Means

1. Gender

Dependent Variable	Gender	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Q23a. I often watch a favorite film again and again.	1-Male	4.864	.162	4.545	5.183
	2-Female	5.290	.123	5.048	5.532
Q23d. I don't like to watch films at home that I've seen before in a theater.	1-Male	2.774	.164	2.453	3.096
	2-Female	2.394	.124	2.150	2.638
Q23f. I watch TV programs with my family that we've seen before, often several times.	1-Male	3.582	.171	3.246	3.918
	2-Female	4.226	.130	3.971	4.481
Q23l. I like playing/listening to a movie I'm familiar with as background while I do other things.	1-Male	3.859	.195	3.474	4.243
	2-Female	4.430	.148	4.138	4.721

2. Q7. How did you watch this movie 1

Dependent Variable	Q7. How did you watch this movie 1	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Q23a. I often watch a favorite film again and again.	1-In theater	4.550	.197	4.163	4.937
	2-On TV/cable	5.551	.236	5.086	6.016
	3-DVD or BluRay	5.275	.198	4.885	5.665
	4-Online	4.934	.179	4.582	5.285
Q23d. I don't like to watch films at home that I've seen before in a theater.	1-In theater	3.012	.198	2.622	3.403
	2-On TV/cable	2.057	.239	1.588	2.526
	3-DVD or BluRay	2.506	.200	2.113	2.900
	4-Online	2.761	.180	2.407	3.116
Q23f. I watch TV programs with my family that we've seen before, often several times.	1-In theater	3.668	.207	3.261	4.076
	2-On TV/cable	4.319	.249	3.829	4.810
	3-DVD or BluRay	4.153	.209	3.742	4.564
	4-Online	3.474	.188	3.104	3.845
Q23l. I like playing/listening to a movie I'm familiar with as background while I do other things.	1-In theater	3.916	.237	3.450	4.382
	2-On TV/cable	4.587	.285	4.027	5.148
	3-DVD or BluRay	4.022	.239	3.552	4.492
	4-Online	4.051	.215	3.627	4.474

3. Gender * Q7. How did you watch this movie 1

Dependent Variable	Gender	Q7. How did you watch this movie 1	Mean	Std. Error	95% Confidence Interval	
					Lower Bound	Upper Bound
Q23a. I often watch a favorite film again and again.	1-Male	1-In theater	4.286	.280	3.735	4.836
		2-On TV/cable	5.579	.416	4.761	6.397
		3-DVD or BluRay	4.848	.316	4.228	5.469
		4-Online	4.745	.264	4.225	5.265
	2-Female	1-In theater	4.814	.277	4.270	5.358
		2-On TV/cable	5.523	.225	5.081	5.965
		3-DVD or BluRay	5.702	.240	5.229	6.174
		4-Online	5.123	.240	4.650	5.595
Q23d. I don't like to watch films at home that I've seen before in a theater.	1-Male	1-In theater	3.071	.282	2.516	3.627
		2-On TV/cable	2.053	.420	1.227	2.878
		3-DVD or BluRay	2.697	.319	2.071	3.323
		4-Online	3.277	.267	2.752	3.802
	2-Female	1-In theater	2.953	.279	2.405	3.502
		2-On TV/cable	2.062	.227	1.615	2.508
		3-DVD or BluRay	2.316	.242	1.839	2.792
		4-Online	2.246	.242	1.769	2.722
Q23f. I watch TV programs with my family that we've seen before, often several times.	1-Male	1-In theater	3.476	.295	2.896	4.056
		2-On TV/cable	4.316	.438	3.454	5.178
		3-DVD or BluRay	3.727	.333	3.073	4.382
		4-Online	2.809	.279	2.260	3.357
	2-Female	1-In theater	3.860	.291	3.287	4.434
		2-On TV/cable	4.323	.237	3.857	4.789
		3-DVD or BluRay	4.579	.253	4.081	5.077
		4-Online	4.140	.253	3.643	4.638
Q23l. I like playing/listening to a movie I'm familiar with as background while I do other things.	1-Male	1-In theater	3.762	.337	3.099	4.425
		2-On TV/cable	4.421	.501	3.435	5.407
		3-DVD or BluRay	3.273	.380	2.525	4.021
		4-Online	3.979	.319	3.352	4.606
	2-Female	1-In theater	4.070	.333	3.414	4.725
		2-On TV/cable	4.754	.271	4.221	5.287
		3-DVD or BluRay	4.772	.289	4.203	5.341
		4-Online	4.123	.289	3.554	4.692

Post Hoc Tests

Q7. How did you watch this movie 1

Multiple Comparisons

Dependent Variable		(I) Q7. How did you watch this movie 1	(J) Q7. How did you watch this movie 1	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Q23a. I often watch a favorite film again and again.	Scheffe	1-In theater	2-On TV/cable	-.98*	.279	.007	-1.77	-.20
			3-DVD or BluRay	-.84*	.274	.027	-1.61	-.07
			4-Online	-.40	.265	.520	-1.14	.35
		2-On TV/cable	1-In theater	.98*	.279	.007	.20	1.77
			3-DVD or BluRay	.15	.275	.963	-.63	.92
			4-Online	.58	.266	.188	-.16	1.33
		3-DVD or BluRay	1-In theater	.84*	.274	.027	.07	1.61
			2-On TV/cable	-.15	.275	.963	-.92	.63
			4-Online	.44	.261	.424	-.30	1.17
		4-Online	1-In theater	.40	.265	.520	-.35	1.14
			2-On TV/cable	-.58	.266	.188	-1.33	.16
			3-DVD or BluRay	-.44	.261	.424	-1.17	.30
Q23d. I don't like to watch films at home that I've seen before in a theater.	Scheffe	1-In theater	2-On TV/cable	.95*	.282	.010	.16	1.74
			3-DVD or BluRay	.56	.277	.259	-.22	1.33
			4-Online	.30	.268	.739	-.45	1.05
		2-On TV/cable	1-In theater	-.95*	.282	.010	-1.74	-.16
			3-DVD or BluRay	-.40	.278	.566	-1.18	.38
			4-Online	-.65	.268	.119	-1.41	.10
		3-DVD or BluRay	1-In theater	-.56	.277	.259	-1.33	.22
			2-On TV/cable	.40	.278	.566	-.38	1.18
			4-Online	-.26	.263	.815	-1.00	.48
		4-Online	1-In theater	-.30	.268	.739	-1.05	.45
			2-On TV/cable	.65	.268	.119	-.10	1.41
			3-DVD or BluRay	.26	.263	.815	-.48	1.00
Q23f. I watch TV programs with my family that we've seen before, often several times.	Scheffe	1-In theater	2-On TV/cable	-.65	.294	.181	-1.48	.18
			3-DVD or BluRay	-.60	.289	.237	-1.41	.22
			4-Online	.13	.279	.974	-.65	.92
		2-On TV/cable	1-In theater	.65	.294	.181	-.18	1.48
			3-DVD or BluRay	.05	.290	.998	-.76	.87
			4-Online	.78	.280	.052	.00	1.57
		3-DVD or BluRay	1-In theater	.60	.289	.237	-.22	1.41
			2-On TV/cable	-.05	.290	.998	-.87	.76
			4-Online	.73	.275	.074	-.04	1.50
		4-Online	1-In theater	-.13	.279	.974	-.92	.65
			2-On TV/cable	-.78	.280	.052	-1.57	.00
			3-DVD or BluRay	-.73	.275	.074	-1.50	.04
Q23l. I like playing/listening to a movie I'm familiar with as background while I do other things.	Scheffe	1-In theater	2-On TV/cable	-.76	.336	.165	-1.71	.18
			3-DVD or BluRay	-.30	.330	.838	-1.23	.62
			4-Online	-.14	.319	.979	-1.04	.76
		2-On TV/cable	1-In theater	.76	.336	.165	-.18	1.71
			3-DVD or BluRay	.46	.331	.595	-.47	1.39
			4-Online	.62	.321	.291	-.28	1.52
		3-DVD or BluRay	1-In theater	.30	.330	.838	-.62	1.23
			2-On TV/cable	-.46	.331	.595	-1.39	.47
			4-Online	.16	.315	.965	-.72	1.05
		4-Online	1-In theater	.14	.319	.979	-.76	1.04
			2-On TV/cable	-.62	.321	.291	-1.52	.28
			3-DVD or BluRay	-.16	.315	.965	-1.05	.72

Based on observed means.
The error term is Mean Square(Error) = 4.774.

*. The mean difference is significant at the .05 level.

Homogeneous Subsets

Q23a. I often watch a favorite film again and again.

	Q7. How did you watch this movie 1	N	Subset 1	Subset 2
Tukey B[a,b,c]	1-In theater	85	4.55	
	4-Online	104	4.95	4.95
	3-DVD or BluRay	90		5.39
	2-On TV/cable	84		5.54
Scheffe[a,b,c]	1-In theater	85	4.55	
	4-Online	104	4.95	4.95
	3-DVD or BluRay	90		5.39
	2-On TV/cable	84		5.54
	Sig.		.536	.200

Means for groups in homogeneous subsets are displayed.
Based on observed means.
The error term is Mean Square(Error) = 3.288.

   a. Uses Harmonic Mean Sample Size = 90.098.

   b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

   c. Alpha = .05.

Q23d. I don't like to watch films at home that I've seen before in a theater.

	Q7. How did you watch this movie 1	N	Subset 1	Subset 2
Tukey B[a,b,c]	2-On TV/cable	84	2.06	
	3-DVD or BluRay	90	2.46	2.46
	4-Online	104	2.71	2.71
	1-In theater	85		3.01
Scheffe[a,b,c]	2-On TV/cable	84	2.06	
	3-DVD or BluRay	90	2.46	2.46
	4-Online	104	2.71	2.71
	1-In theater	85		3.01
	Sig.		.128	.246

Means for groups in homogeneous subsets are displayed.
Based on observed means.
The error term is Mean Square(Error) = 3.348.

a. Uses Harmonic Mean Sample Size = 90.098.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

c. Alpha = .05.

Q23f. I watch TV programs with my family that we've seen before, often several times.

	Q7. How did you watch this movie 1	N	Subset 1	Subset 2
Tukey B[a,b,c]	4-Online	104	3.54	
	1-In theater	85	3.67	3.67
	3-DVD or BluRay	90		4.27
	2-On TV/cable	84		4.32
Scheffe[a,b,c]	4-Online	104	3.54	
	1-In theater	85	3.67	
	3-DVD or BluRay	90	4.27	
	2-On TV/cable	84	4.32	
	Sig.		.058	

Means for groups in homogeneous subsets are displayed.
Based on observed means.
The error term is Mean Square(Error) = 3.652.

a. Uses Harmonic Mean Sample Size = 90.098.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

c. Alpha = .05.

Q23I. I like playing/listening to a movie I'm familiar with as background while I do other things.

	Q7. How did you watch this movie 1	N	Subset 1
Tukey B[a,b,c]	1-In theater	85	3.92
	4-Online	104	4.06
	3-DVD or BluRay	90	4.22
	2-On TV/cable	84	4.68
Scheffe[a,b,c]	1-In theater	85	3.92
	4-Online	104	4.06
	3-DVD or BluRay	90	4.22
	2-On TV/cable	84	4.68
	Sig.		.143

Means for groups in homogeneous subsets are displayed.
Based on observed means.
The error term is Mean Square(Error) = 4.774.

a. Uses Harmonic Mean Sample Size = 90.098.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

c. Alpha = .05.

Profile Plots

Q23a. I often watch a favorite film again and again.
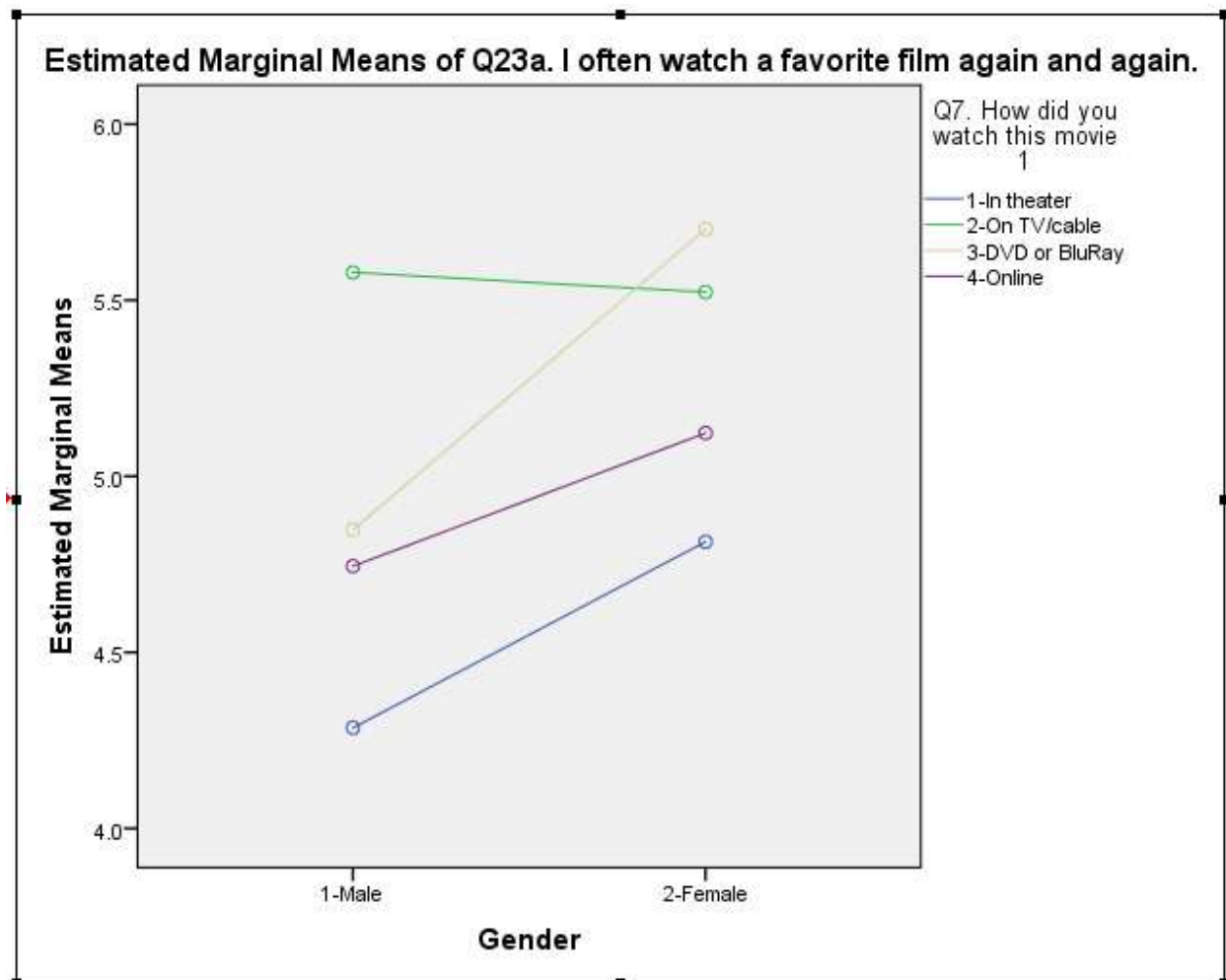
Estimated Marginal Means of Q23a. I often watch a favorite film again and again.

Q23d. I don't like to watch films at home that I've seen before in a theater.

Estimated Marginal Means of Q23d. I don't like to watch films at home that I've seen before in a theater.

Q23f. I watch TV programs with my family that we've seen before, often several times.

Estimated Marginal Means of Q23f. I watch TV programs with my family that we've seen before, often several times.

Q23l. I like playing/listening to a movie I'm familiar with as background while I do other things.
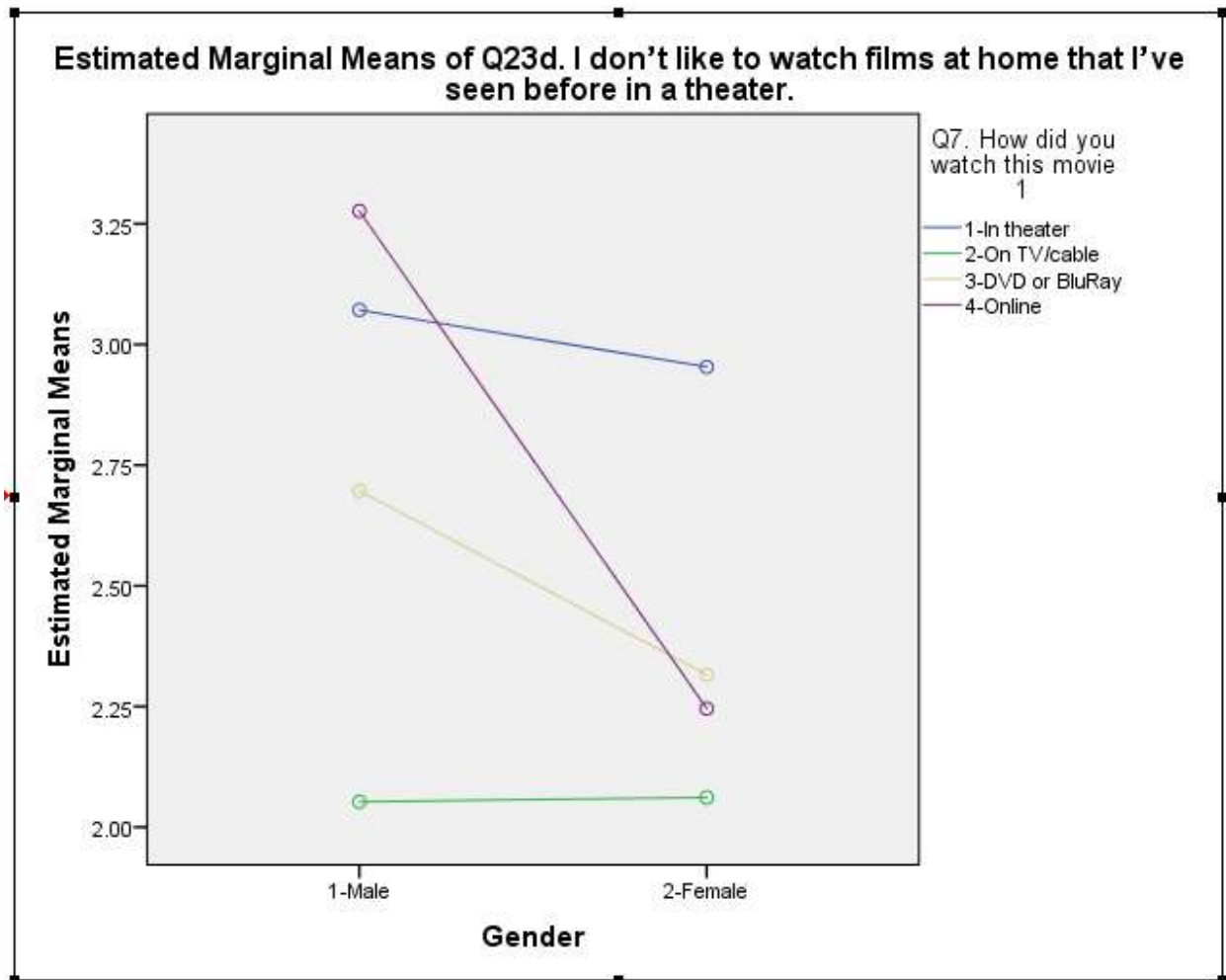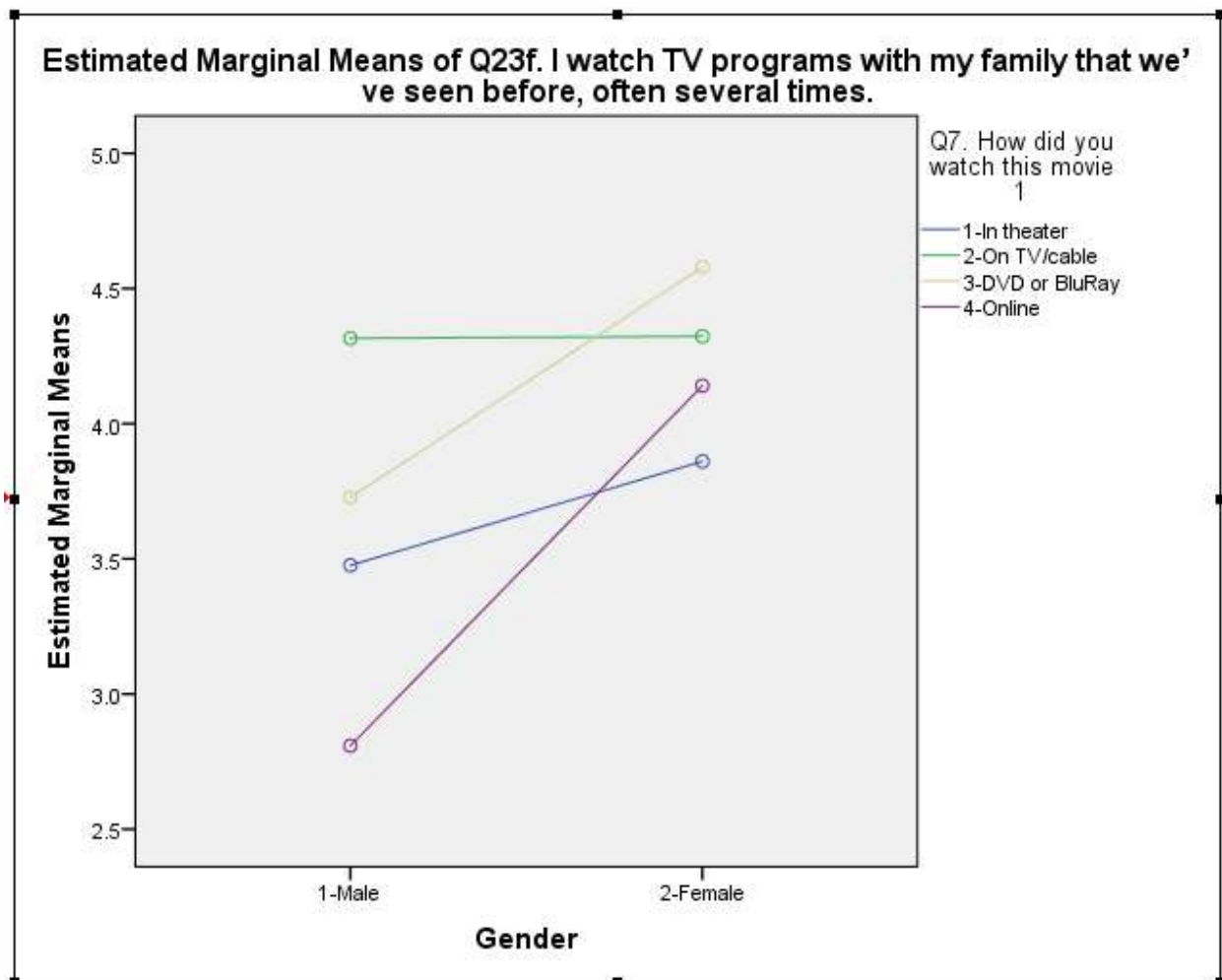
Estimated Marginal Means of Q23l. I like playing/listening to a movie I'm familiar with as background while I do other things.
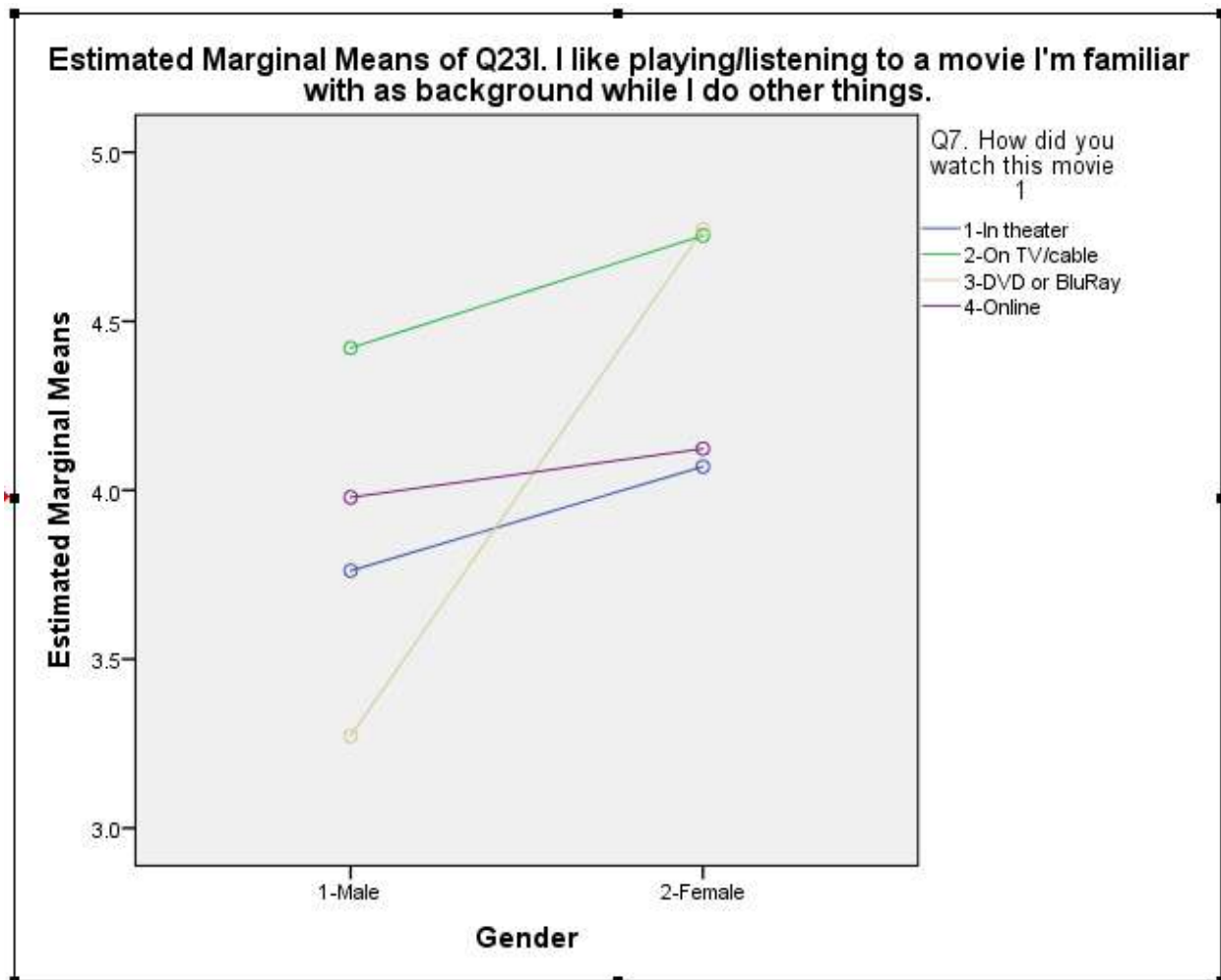
IV. TABLING

Table 1: Multivariate Statistics for MANOVA

Effect		Value	F-Value	Sig.	Observed Power
Main Effect: Gender	Pillai's Trace	.035	3.204^b	.013	.825
	Wilks' Lambda	.965	3.204^b	.013	.825
	Hotelling's Trace	.036	3.204^b	.013	.825
	Roy's Largest Root	.036	3.204^b	.013	.825
Main Effect: Q7. "How did you watch this movie 1?"	Pillai's Trace	.069	2.073	.016	.938
	Wilks' Lambda	.932	2.087	.016	.900
	Hotelling's Trace	.072	2.097	.015	.941
	Roy's Largest Root	.056	4.938^c	.001	.959
Interaction: Gender X Q7. "How did you watch this movie 1?"	Pillai's Trace	.049	1.483	.124	.808
	Wilks' Lambda	.951	1.485	.124	.743
	Hotelling's Trace	.051	1.485	.123	.809
	Roy's Largest Root	.035	3.132^c	.015	.816

b. Exact Statistic
c. The statistic is an upper bound on F that yields a lower bound on the significance level.
d. Computed using alpha = .05

Table 2. Two-factor ANOVA Predicting Q23a. "I often watch a favorite film again and again"
From Gender and Q7. "How did you watch this movie 1?"

	Mean	n	Sum of Squares	df	Mean Square	F	Sig.	Partial eta^2
Main Effect: Gender			14.388	1	14.388	4.376	.037	.012
2-Female	5.33	222						
1-Male	4.74	141						
Main Effect: Q7. "How did you watch this movie 1?"			41.536	3	13.845	4.211	.006	.034
1- In theater	4.55	85						
2- On TV/cable	5.54	84						
3- DVD or Blu-ray	5.39	90						
4- Online	4.95	104						
Interaction: Gender X Q7. "How did you watch this movie 1?"			7.417	3	2.472	.752	.522	.006
Error			1167.179	355	3.288			

Table 3. Two-factor ANOVA predicting Q23d. "I don't like to watch films at home that I've seen before in a theater" From Gender and Q7. "How did you watch this movie 1?"

	Mean	n	Sum of Squares	df	Mean Square	F	Sig.	Partial eta^2
Main Effect: Gender			11.470	1	11.470	3.426	.065	.010
2-Female	2.35	222						
1-Male	2.91	141						
Main Effect: Q7. "How did you watch this movie 1?"			34.771	3	11.590	3.462	.017	.028
1- In theater	3.01	85						
2- On TV/cable	2.06	84						
3- DVD or Blu-ray	2.46	90						
4- Online	2.71	104						
Interaction: Gender X Q7. "How did you watch this movie 1?"			14.232	3	4.744	1.417	.238	.012
Error			1188.645	355	3.348			

Table 4. Two-factor ANOVA predicting Q23f. "I watch TV programs with my family that we've seen before, often several times" from Gender and Q7. "How did you watch this movie 1?"

	Mean	n	Sum of Squares	df	Mean Square	F	Sig.	Partial eta^2
Main Effect: Gender			32.868	1	32.868	8.999	.003	.025
2-Female	4.25	222						
1-Male	3.43	141						
Main Effect: Q7. "How did you watch this movie 1?"			37.975	3	12.658	3.466	.016	.028
1- In theater	3.67	85						
2- On TV/cable	4.32	84						
3- DVD or Blu-ray	4.27	90						
4- Online	3.54	104						
Interaction: Gender X Q7. "How did you watch this movie 1?"			19.859	3	6.620	1.812	.145	.015
Error			1296.554	355	3.652			

Table 5. Two-factor ANOVA predicting Q23l. "I like playing/listening to a movie I'm familiar with as background while I do other things" from Gender and Q7. "How did you watch this movie 1?"

	Mean	n	Sum of Squares	df	Mean Square	F	Sig.	Partial eta^2
Main Effect: Gender			25.856	1	25.856	5.416	.021	.015
2-Female	4.46	222						
1-Male	3.81	141						
Main Effect: Q7. "How did you watch this movie 1?"			17.604	3	5.868	1.229	.299	.010
1- In theater	3.92	85						
2- On TV/cable	4.68	84						
3- DVD or Blu-ray	4.22	90						
4- Online	4.06	104						
Interaction: Gender X Q7. "How did you watch this movie 1?"			25.001	3	8.334	1.746	.157	.015
Error			1694.802	355	4.774			

V.   WRITEUP OF RESULTS

Writeup of MANOVA

Four dependent variables were selected from the Jeffres and Neuendorf (2015) Film and TV Usage National Survey, all of which have significant intercorrelations at *p < .001*. The variables are as follows, with all measured using a 1-7 response scale (1="not like me at all"; 7="very much like me"):

Q23a. "I often watch a favorite film again and again."

Q23d. "I don't like to watch films at home that I've seen before in a theater."

Q23f. "I watch TV programs with my family that we've seen before, often several times."

Q23l. "I like playing/listening to a movie I'm familiar with as background while I do other things."

Independent variables chosen were Gender and Q7. "How did you watch this movie 1?" (1 = In a theater, 2 = On TV/Cable, 3 = DVD/Blu-ray, 4 = Online). The factorial design is 2 x 4.

Assumptions

Box's M tested for homoscedasticity. It specifically tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups. It is ideal for Box's M to be non-significant to reject the null. For this set of variables Box's M is significant, *p < .001*.

Multivariate Tests

The multivariate tests in Table 1 indicate that the variable Gender has a significant main effect on the set of dependent variables; Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root are all *p < .05*. Table 1 also shows that Q7. "How did you watch this movie 1?" has a significant main effect on the set of dependent variables; Pillai's Trace, Wilks'

Lambda, Hotelling's Trace, and Roy's Largest Root are all $p < .05$. The interaction effect test only indicates a significant result with Roy's Largest Root at $p < .05$. A series of four ANOVAs were conducted to further examine the significance of the main effects and interaction effect for each of the four dependent variables individually.

ANOVAS

Table 2 shows the ANOVA predicting Q23a. "I often watch a favorite film again and again." The table indicates both main effects of Gender and Q7. "How did you watch this movie 1?" are significant at $p < .05$. The interaction is not significant. The main effect of Gender shows that females are higher in watching a favorite film again and again than males. The main effect of Q7. "How did you watch this movie 1?" shows people who prefer to watch films on TV/cable are the highest on watching a favorite film again and again, with those who prefer to watch via DVD/BluRay second highest. Post hocs indicate that these two groups' means are significantly higher than the means for the other two groups.

Table 3 shows the ANOVA predicting Q23d. "I don't like to watch films at home that I've seen before in a theater." The table indicates that the main effect for Q7. "How did you watch this movie 1?" is significant at $p < .05$. The main effect for Gender and the interaction are both non-significant. The main effect of Q7. "How did you watch this movie 1?" shows people who responded "In a theater" are highest in disfavor of watching a film at home that they have seen before in a theater. Post hocs indicate that this group's mean is significantly higher than the mean for the group that prefers to watch films on TV/cable.

Table 4 shows the ANOVA predicting Q23f. "I watch TV programs with my family that we've seen before, often several times." The table indicates both main effects of Gender and Q7. "How did you watch this movie 1?" are significant at $p < .05$. The interaction is not significant. The main effect of Gender shows that females are higher in watching TV programs

with their family that they have seen before, often several times than males. The main effect of Q7. "How did you watch this movie 1?" shows people who responded "On TV/cable" are highest in repeatedly watching TV programs that they have seen before with their family. However, post hocs indicate that this group's mean is not significantly higher than any other single group.

Tables 5 shows the ANOVA predicting Q23l. "I like playing/listening to a movie I'm familiar with as background while I do other things." The table indicates that the main effect of Gender is significant at $p < .05.$ The main effect of Q7. "How did you watch this movie 1?" and the interaction effect are both non-significant. The main effect of Gender shows that males are higher in favor of playing/listening to a movie they are familiar with as background while they do things than females.