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Notes:

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. use "http://myweb.liu.edu/~redowl/data/SAMHDA-Grade10-2008-selected.dta", clear
(Monitoring the Future: A Continuing Study of American Youth (8th- and 10th-Grade)

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. factor V111-V1281, factors(5)

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V111 ambiguous abbreviation

```

r(111);

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```

. factor V1111-V1281, factors(5)

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(obs=1138)

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Factor analysis/correlation      Number of obs   =   1138
Method: principal factors        Retained factors =     5

```

Rotation: (unrotated)

Number of params = 160

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor1	7.04703	4.36213	0.4402	0.4402
Factor2	2.68490	0.81358	0.1677	0.6079
Factor3	1.87133	0.52877	0.1169	0.7247
Factor4	1.34255	0.12456	0.0839	0.8086
Factor5	1.21799	0.47424	0.0761	0.8847
Factor6	0.74376	0.06289	0.0465	0.9311
Factor7	0.68086	0.08248	0.0425	0.9737
Factor8	0.59839	0.06617	0.0374	1.0110
Factor9	0.53221	0.08945	0.0332	1.0443
Factor10	0.44276	0.18950	0.0277	1.0719
Factor11	0.25326	0.04132	0.0158	1.0877
Factor12	0.21194	0.02214	0.0132	1.1010
Factor13	0.18980	0.04969	0.0119	1.1128
Factor14	0.14011	0.05638	0.0088	1.1216
Factor15	0.08374	0.01834	0.0052	1.1268
Factor16	0.06540	0.03098	0.0041	1.1309
Factor17	0.03442	0.02565	0.0021	1.1331
Factor18	0.00877	0.01839	0.0005	1.1336
Factor19	-0.00962	0.00294	-0.0006	1.1330
Factor20	-0.01256	0.04808	-0.0008	1.1322
Factor21	-0.06064	0.01400	-0.0038	1.1284
Factor22	-0.07465	0.02163	-0.0047	1.1238
Factor23	-0.09628	0.00951	-0.0060	1.1178

Factor24		-0.10579	0.00652	-0.0066	1.1111
Factor25		-0.11231	0.00736	-0.0070	1.1041
Factor26		-0.11968	0.01734	-0.0075	1.0967
Factor27		-0.13702	0.01857	-0.0086	1.0881
Factor28		-0.15559	0.01268	-0.0097	1.0784
Factor29		-0.16827	0.01668	-0.0105	1.0679
Factor30		-0.18495	0.00564	-0.0116	1.0563
Factor31		-0.19059	0.01523	-0.0119	1.0444
Factor32		-0.20581	0.01934	-0.0129	1.0316
Factor33		-0.22515	0.05493	-0.0141	1.0175
Factor34		-0.28008	.	-0.0175	1.0000

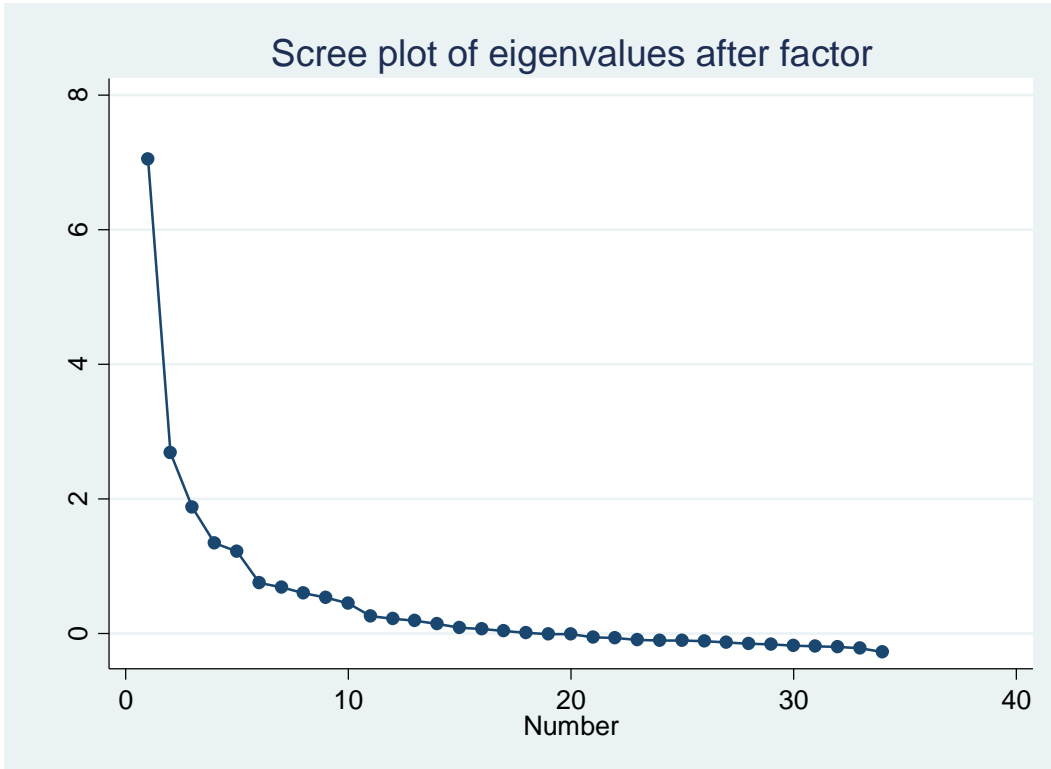
 LR test: independent vs. saturated: chi2(561) = 1.8e+04 Prob>chi2 = 0.0000

Factor loadings (pattern matrix) and unique variances

Variable		Factor1	Factor2	Factor3	Factor4	Factor5		Uniqueness
V1111		0.1315	0.5271	0.3442	-0.0137	0.0227		0.5857
V1112		0.1445	0.5903	0.5024	0.1141	0.0105		0.3652
V1115		0.0774	0.1375	0.2706	-0.1003	-0.0036		0.8918
V1116		0.0768	0.1729	0.2448	0.0090	-0.0363		0.9029
V1117		0.1542	0.5692	0.4970	0.1154	0.0040		0.3920
V1118		0.1275	0.5424	0.4092	-0.0328	-0.0276		0.5203
V1122		0.0609	-0.0163	0.0898	0.0316	-0.1261		0.9711
V1161		0.7321	-0.1704	0.1500	-0.2812	-0.0272		0.3326
V1162		0.7358	-0.0652	0.0939	-0.3427	-0.0746		0.3225
V1163		0.4780	-0.0456	0.0648	-0.0335	-0.0853		0.7568
V1167		0.4844	-0.1571	0.0738	0.2583	0.0101		0.6684

V1168		0.6335	0.0089	0.0029	0.2896	0.0222		0.5142
V1169		0.6873	-0.1013	-0.0112	0.2941	-0.1213		0.4160
V1175		0.3328	0.0208	-0.0918	0.1373	0.1897		0.8255
V1176		0.6753	-0.3209	0.1300	-0.1973	0.2287		0.3328
V1177		0.7565	-0.2565	0.1535	-0.3385	0.2139		0.1780
V1178		0.7235	-0.1423	0.0949	-0.3543	0.1604		0.2961
V1183		0.4998	-0.2591	0.1130	0.2925	0.2993		0.4951
V1184		0.5971	-0.0528	0.0016	0.3843	0.3397		0.3776
V1185		0.6416	-0.0945	-0.0347	0.3414	0.1405		0.4418
V1191		-0.4743	-0.1568	0.1758	-0.0161	0.2680		0.6475
V1192		0.2034	0.1804	-0.1137	-0.0404	-0.2711		0.8380
V1195		-0.5458	0.0370	0.1144	-0.2661	0.4052		0.4527
V1199		-0.6159	0.0180	0.1144	-0.1389	0.4609		0.3755
V1202		-0.6257	-0.0055	0.0154	0.3013	0.2900		0.4333
V1220		-0.2914	-0.0504	0.1385	-0.0197	0.2014		0.8524
V1258		-0.1774	-0.0618	-0.0073	-0.0552	0.0654		0.9573
V1265		0.2439	0.3426	-0.2152	-0.0854	0.0955		0.7604
V1267		0.1763	0.2178	-0.0915	-0.0630	0.0942		0.9003
V1268		0.2485	0.3767	-0.3169	-0.0524	0.1180		0.6792
V1270		0.3238	0.5724	-0.5115	-0.0779	0.2243		0.2495
V1271		0.3362	0.5519	-0.5303	-0.0641	0.2019		0.2563
V1272		0.0081	-0.1276	0.1366	-0.0112	0.0341		0.9637
V1281		-0.1909	-0.1794	0.1606	0.1045	0.1045		0.8837

. scree



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. rotate, orthogonal varimax normalize blank(.40)
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Factor analysis/correlation          Number of obs   =    1138
Method: principal factors            Retained factors =     5
Rotation: orthogonal varimax (Kaiser on)  Number of params =   160
```

Factor	Variance	Difference	Proportion	Cumulative
Factor1	3.58454	0.31719	0.2239	0.2239
Factor2	3.26735	0.74690	0.2041	0.4280
Factor3	2.52045	0.03661	0.1574	0.5854
Factor4	2.48384	0.17621	0.1551	0.7405

Factor5 | 2.30763 . 0.1441 0.8847

 LR test: independent vs. saturated: chi2(561) = 1.8e+04 Prob>chi2 = 0.0000

Rotated factor loadings (pattern matrix) and unique variances

Variable	Factor1	Factor2	Factor3	Factor4	Factor5	Uniqueness
V1111					0.6195	0.5857
V1112					0.7837	0.3652
V1115						0.8918
V1116						0.9029
V1117					0.7669	0.3920
V1118					0.6769	0.5203
V1122						0.9711
V1161	0.7156					0.3326
V1162	0.7115					0.3225
V1163						0.7568
V1167		0.4903				0.6684
V1168		0.5713				0.5142
V1169		0.5649	0.4631			0.4160
V1175						0.8255
V1176	0.7024	0.4105				0.3328
V1177	0.8334					0.1780
V1178	0.7712					0.2961
V1183		0.6608				0.4951
V1184		0.7562				0.3776
V1185		0.6765				0.4418
V1191			-0.4916			0.6475

V1192				0.8380
V1195		-0.6560		0.4527
V1199		-0.7192		0.3755
V1202	-0.5401	-0.4997		0.4333
V1220				0.8524
V1258				0.9573
V1265		0.4637		0.7604
V1267				0.9003
V1268		0.5517		0.6792
V1270		0.8558		0.2495
V1271		0.8486		0.2563
V1272				0.9637
V1281				0.8837

 (blanks represent abs(loading)<.4)

Factor rotation matrix

	Factor1	Factor2	Factor3	Factor4	Factor5
Factor1	0.6083	0.5779	0.4680	0.2500	0.1204
Factor2	-0.2907	-0.1732	0.0674	0.6603	0.6670
Factor3	0.1976	0.0386	-0.1577	-0.6286	0.7344
Factor4	-0.6944	0.6819	0.1455	-0.1747	0.0327
Factor5	0.1555	0.4118	-0.8546	0.2753	-0.0114

. sort1

Rotated factor loadings (pattern matrix) and unique variances sorted

Variable	Factor1	Factor2	Factor3	Factor4	Factor5	Uniqueness
V1177	0.8334	0.3448	0.0805	0.0412	0.0192	0.1780
V1178	0.7712	0.2709	0.1254	0.1333	0.0485	0.2961
V1161	0.7156	0.2554	0.2898	0.0178	0.0758	0.3326
V1162	0.7115	0.1757	0.3391	0.1211	0.1037	0.3225
V1176	0.7024	0.4105	0.0498	-0.0275	-0.0463	0.3328
V1202	-0.5401	-0.0351	-0.4997	-0.1425	-0.0611	0.4333
V1163	0.3268	0.2286	0.2785	0.0310	0.0746	0.7568
V1184	0.1649	0.7562	0.0413	0.1398	0.0465	0.3776
V1185	0.1957	0.6765	0.2290	0.0988	-0.0017	0.4418
V1183	0.2451	0.6608	-0.0147	-0.0859	-0.0235	0.4951
V1168	0.1858	0.5713	0.3198	0.1179	0.0935	0.5142
V1169	0.2223	0.5649	0.4631	0.0272	0.0180	0.4160
V1167	0.1771	0.4903	0.2334	-0.0713	0.0160	0.6684
V1175	0.1124	0.3569	0.0295	0.1829	-0.0112	0.8255
V1199	-0.1891	-0.2596	-0.7192	-0.0628	0.0121	0.3755
V1195	-0.0723	-0.3320	-0.6560	-0.0259	0.0296	0.4527
V1191	-0.1554	-0.1407	-0.4916	-0.2561	-0.0362	0.6475
V1192	0.0348	-0.0573	0.3511	0.1739	0.0631	0.8380
V1220	-0.0902	-0.0848	-0.3366	-0.1343	0.0301	0.8524
V1258	-0.0429	-0.1028	-0.1499	-0.0529	-0.0705	0.9573
V1122	0.0180	0.0112	0.1256	-0.0922	0.0648	0.9711
V1270	0.0185	0.1075	0.0678	0.8558	0.0400	0.2495
V1271	0.0152	0.1177	0.0964	0.8486	0.0147	0.2563
V1268	0.0338	0.0790	0.0832	0.5517	0.0454	0.6792
V1265	0.0804	0.0544	0.0772	0.4637	0.0959	0.7604

V1267		0.0843	0.0564	0.0219	0.2823	0.0962		0.9003
V1281		-0.0885	0.0413	-0.2009	-0.2566	-0.0225		0.8837
V1272		0.0821	0.0385	-0.0571	-0.1568	0.0154		0.9637
V1112		-0.0621	0.0828	0.0359	0.0931	0.7837		0.3652
V1117		-0.0530	0.0900	0.0455	0.0829	0.7669		0.3920
V1118		0.0192	-0.0381	0.0506	0.1309	0.6769		0.5203
V1111		0.0078	-0.0020	0.0214	0.1732	0.6195		0.5857
V1116		0.0330	0.0151	0.0413	-0.0320	0.3051		0.9029
V1115		0.1297	-0.0385	-0.0087	-0.0434	0.2965		0.8918

Findings and Interpretation

Exploratory Factor Analysis (EFA) was applied to data selected from the study Monitoring the Future: A Continuing Study of American Youth (8th- and 10th-grade surveys) (U.S. Department of Health and Human Services, 2008). The purpose of that survey was to determine the on-going changes in attitudes, behaviors, and values of American youth and the relationship between the changes and the trends. The study is conducted annually in schools with students in grades 8, 10, and 12, but this survey focused on the behaviors, attitudes, and values of 10th graders in American public schools. To reveal the pattern of latent variables and underlying structure, Stata/IC version 12.1 was used to conduct an exploratory factor analysis of the 34 selected variables.

Upon visual inspection of the unrotated factors, the first five factors were found to explain about 88.5% of the common variance in the data set. In addition, based on the eigenvalues using Kaiser's rule (eigenvalues > 1), the results of the scree plot analysis (see Figure 1), and the directions for the analysis project, five factors were extracted and submitted to orthogonal rotation using the varimax procedure with Kaiser normalization.

[Insert Figure 1 about here.]

Table 1 displays the rotated factors, factor loadings, and uniqueness statistic (U), as well as the labels, for each of the variables. Following convention, factor loadings equal to or greater than $|+/-0.40|$ were given emphasis in the hermeneutic interpretation and labeling of the respective factors. Variables whose factor loadings do not satisfy that cut-off criterion were excluded from further analysis and do not appear in the table. Twenty-three variables with acceptable factor loadings were retained in the analysis. Each of the rotated factors will be described in turn below.

[Insert Table 1 about here.]

Factor 1 is interpreted and labeled as Perceived Risk and Disapproval of Use of Marijuana. It presents an eigenvalue of 3.6 and accounts for 22.4% of the variance in the data set. It is reflected by positive factor loadings above the criterion cut-off of $|+/-0.40|$ ranging from 0.70 to 0.83. A single negative loading of -0.54 (which cross-loads on Factor 3 at -0.50) is also observed.

Factor 2 is named Perceived Risk and Disapproval of Use of Alcohol. It manifests an eigenvalue of 3.3 and explains 20.4% of the variance. It presents positive factor loadings above the cut-off $|+/-0.40|$ from 0.41 to 0.75. One variable with a positive loading of 0.46 also cross-loads on Factor 3 at 0.46).

Factor 3 is construed and identified as Lifetime and Recent Frequency of Use or Abuse of Alcohol, Illegal Drugs, and Cigarettes. Its eigenvalue is 2.5, and it accounts for 15.7 % of the variance. Using the criterion cut-off $|+/-0.40|$ it presents a single positive factor loading of 0.46 and several negative factor loadings ranging from -0.49 to -0.71.

Factor 4 is interpreted as and named Likelihood of Graduating from a 4-Year College. As in Factor 3, the eigenvalue is 2.5, but the percentage of variance accounted for is slightly lower at 15.5%. It is reflected by positive factor loadings above the cut-off $|+/-0.40|$ extending from 0.46 to 0.85.

Factor 5 is interpreted and labeled as Frequency of Reading Print Media for News and Information. It has an eigenvalue of 2.3 and accounts for 14.4% of the variance. This factor is indicated by positive factor loadings using the criterion cut-off $|+/-0.40|$ from 0.62 to 0.78.

The study revealed that, within the selected data reviewed in this survey, there is an underlying structure comprising five concepts, which explain 88.4% of the common variance.

The first three factors share 10th graders' behaviors, attitudes, and values about the use of illegal substances and alcohol. The high positive loadings in Factor 4 reveal 10th graders desire to graduate from a 4-year college and the consistency of positive loadings in Factor 5 explain the regularity in which 10th graders use print media to obtain information.

References

Acock, A. C. (2010). *A gentle introduction to Stata* (3rd ed.). College Station, TX: Stata Press.

U.S. Department of Health and Human Services, Substance Abuse and Mental Health Services Administration Office of Applied Studies. (2008). *Monitoring the future: A continuing study of American youth (8th- and 10th-grade surveys)* (I.C.P.S.R. 25422).

Table 1

Factor Loadings Matrix (After Varimax Rotation)

Variable	Factor1	Factor2	Factor3	Factor4	Factor5	<i>U</i>	Statement Text
V1177	0.833					0.178	How much risk from smoking marijuana occasionally
V1178	0.771					0.296	How much risk from smoking marijuana regularly
V1161	0.716					0.333	Do you disapprove others smoking marijuana occasionally
V1162	0.712					0.323	Do you disapprove others smoking marijuana regularly
V1176	0.702	0.411				0.333	How much risk is there from trying marijuana once or twice
V1202	-0.540		-0.500			0.433	How many times have you used illegal drugs in your lifetime
V1184		0.756				0.378	How much risk from drinking 1-2 alcohol beverages per day
V1185		0.677				0.442	How much risk from drinking 5 or more alcohol bevs on weekend
V1183		0.661				0.495	How much risk from trying 1 or 2 alcohol beverages
V1168		0.571				0.514	Do you disapprove others drinking 1-2 alcohol beverages per day
V1169		0.565	0.463			0.416	Do you disapprove others drinking 5 or more alcohol bevs on weekend
V1167		0.490				0.668	Do you disapprove others trying alcohol beverages
V1199			-0.719			0.376	How many times have you been drunk in your lifetime
V1195			-0.656			0.453	How many times have you used alcohol beverages in your lifetime

V1191			-0.492		0.648	How often you smoked cigarettes in last month
V1270			0.856		0.250	How likely is it you will go to college
V1271			0.849		0.256	How likely is it you will graduate from 4-year college
V1268			0.552		0.679	How likely is it you will graduate from high school
V1265			0.464		0.760	What is your average grade in school this year
V1112				0.784	0.365	How often do you read newspapers
V1117				0.767	0.392	How often do you get info from newspaper
V1118				0.677	0.520	How often do you get info from magazines
V1111				0.620	0.586	How often do you read magazines
EV	3.6	3.3	2.5	2.5	2.3	
%VAR	22.4%	20.4%	15.7%	15.5%	14.4%	

Note. *U* = uniqueness; *EV* = eigenvalue; % *VAR* = % variance explained. Total common variance explained = 88.4%. Variables that do not manifest loadings $\geq |+-0.40|$ are not shown.

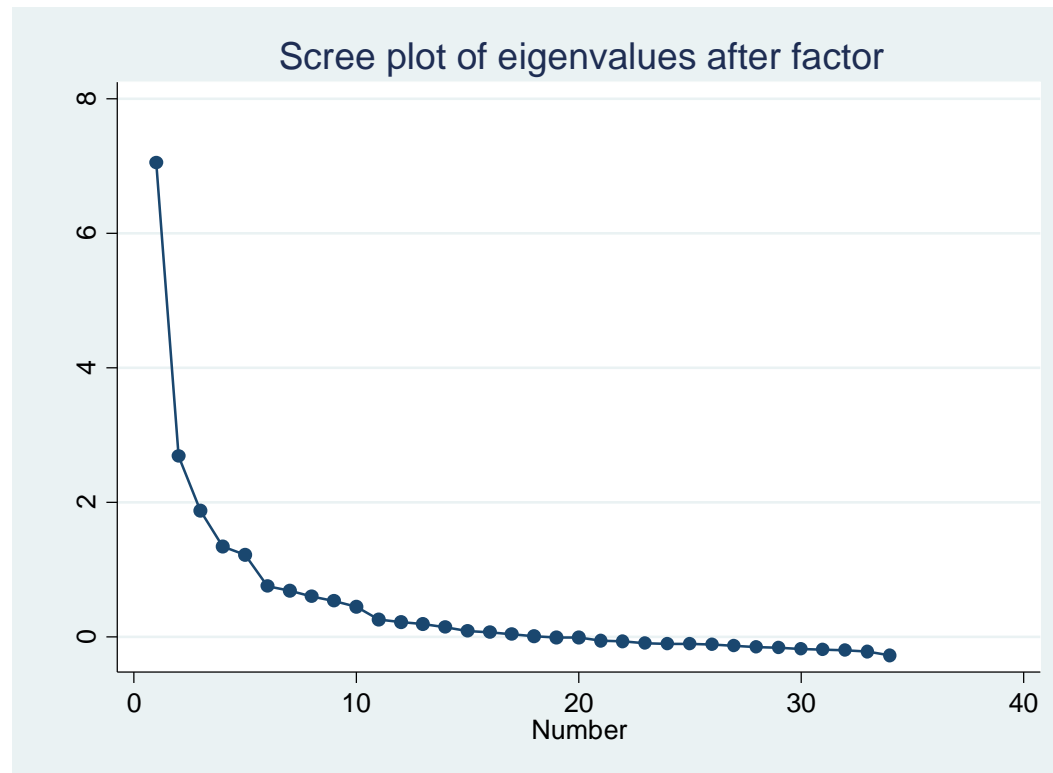


Figure 1. Scree plot of the eigenvalues of the unrotated factor analysis.

Works Consulted

- Afifi, A., May, S., & Clark, V. A. (2012). *Practical multivariate analysis* (5th ed.). Boca Raton, FL: Taylor & Francis Group.
- Holcomb-McCoy, C., Harris, P., Hines, E. M., & Johnston, G. (2008). School counselors' multicultural self-efficacy: A preliminary investigation. *Professional School Counseling, 11*, 166-178. Retrieved from <http://schoolcounselor.metapress.com.cwplib.proxy.liu.edu/content/uv7343184508722q/fulltext.pdf>
- Xu, J. (2005). Purposes for doing homework reported by middle and high school students. *The Journal of Educational Research, 99*, 46-55. Retrieved from <http://web.ebscohost.com/ehost/pdfviewer/pdfviewer?sid=cae78967-f6f2-470a-a4f1-5856ca58448b%40sessionmgr11&vid=1&hid=15>