

Exploratory Factor Analysis II

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1 Preliminaries

In this section, the RStudio workspace and console panes are cleared of old output, variables, and other miscellaneous debris. Packages are loaded.

```
options(replace.assign = TRUE, width = 65, digits = 4, scipen = 4, fig.width = 4,
        fig.height = 4)
# Clear the workspace and console.
rm(list = ls(all = TRUE))
cat("\f")
```

```
# Turn off showing of significance asterisks.
options(show.signif.stars = F)
# Set the contrast option; important for ANOVAs.
options(contrasts = c("contr.sum", "contr.poly"))
how_long <- Sys.time()
set.seed(123)
library(knitr)
```

1.1 Packages

```
library(psych)
library(car)

## Loading required package: carData
##
## Attaching package: 'car'
## The following object is masked from 'package:psych':
##
##   logit

library(multcomp)

## Loading required package: mvtnorm
## Loading required package: survival
## Loading required package: TH.data
## Loading required package: MASS
##
## Attaching package: 'TH.data'
## The following object is masked from 'package:MASS':
##
##   geyser
```

```

library(ggplot2)

##
## Attaching package: 'ggplot2'
## The following objects are masked from 'package:psych':
##
##    %+%, alpha

library(MASS)
library(parallel)
library(corrgram)

## Error in library(corrgram): there is no package called 'corrgram'

library(ellipse)

##
## Attaching package: 'ellipse'
## The following object is masked from 'package:car':
##
##    ellipse
## The following object is masked from 'package:graphics':
##
##    pairs

library(FactoMineR)

## Warning: package 'FactoMineR' was built under R version 3.5.1

library(PerformanceAnalytics)

## Warning: package 'PerformanceAnalytics' was built under R version 3.5.1
## Loading required package: xts
## Loading required package: zoo
##
## Attaching package: 'zoo'
## The following objects are masked from 'package:base':
##
##    as.Date, as.Date.numeric
##
## Attaching package: 'PerformanceAnalytics'
## The following object is masked from 'package:graphics':
##
##    legend

library(plotpc)

## Loading required package: grid

library(sciplot)
library(GPArotation)
library(GGally)
library(MVN)

## sROC 0.1-2 loaded

library(qqplotr)
library(scatterplot3d)
library(rgl)

```

```
## Warning: package 'rgl' was built under R version 3.5.1
library(cowplot)

##
## Attaching package: 'cowplot'
## The following object is masked from 'package:ggplot2':
##
## ggsave
```

1.2 Data File

The example data set comes from a sample of 538 university students who completed the Schwartz Values Inventory (1992). Participants rated the importance of 46 values representing 10 basic groups of values:

- 1. Universalism*
- 2. Benevolence*
- 3. Tradition*
- 4. Conformity*
- 5. Security*
- 6. Power*
- 7. Achievement*
- 8. Hedonism*
- 9. Stimulation*
- 10. Self-Direction*

Each value was rated using the following rating scale:

- 1 = not at all important*
- 2 = slightly important*
- 3 = somewhat important*
- 4 = moderately important*
- 5 = very important*
- 6 = extremely important*
- 7 = completely important*

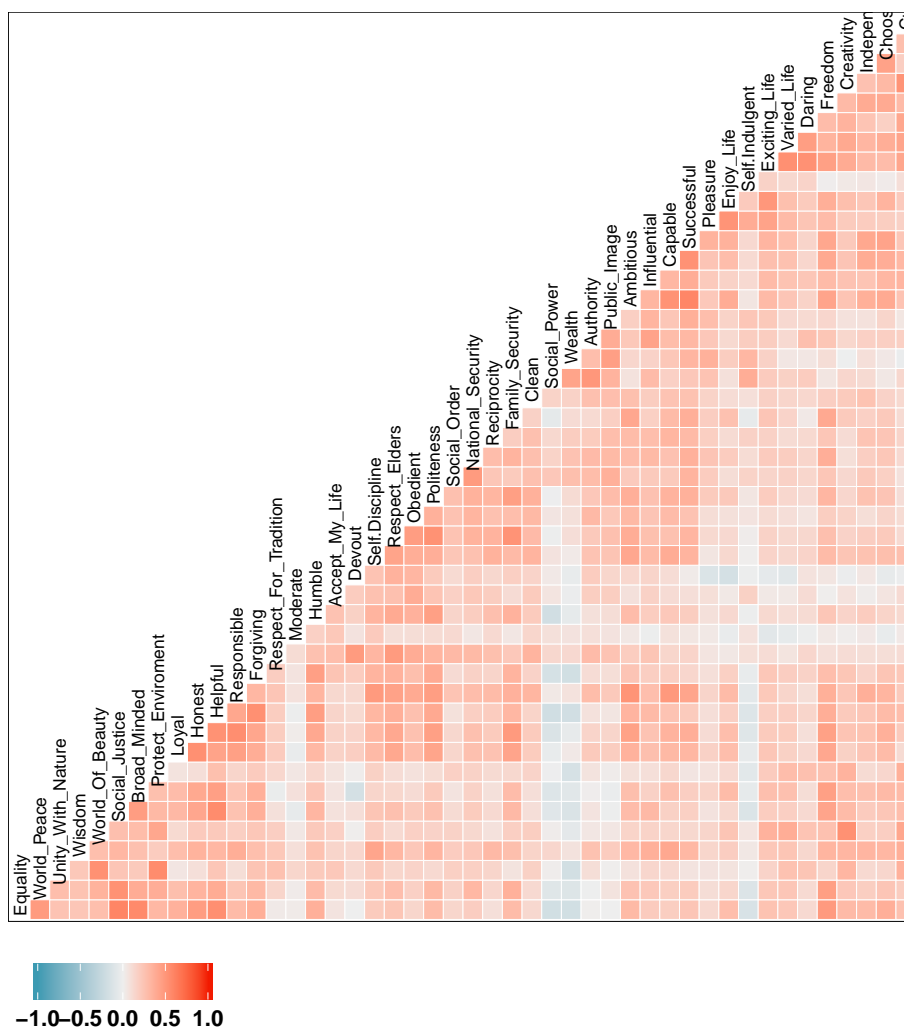
```
# Get the drug use data from the working directory.
setwd("C:\\Courses\\Psychology 516\\PowerPoint\\2018")
SVI <- read.table("values.csv", sep = ",", header = TRUE)
SVI <- as.data.frame(SVI)
SVI <- na.omit(SVI)
names(SVI) <- c("ID", "Equality", "World_Peace", "Unity_With_Nature",
  "Wisdom", "World_Of_Beauty", "Social_Justice", "Broad_Minded",
  "Protect_Enviroment", "Loyal", "Honest", "Helpful", "Responsible",
  "Forgiving", "Respect_For_Tradition", "Moderate", "Humble", "Accept_My_Life",
  "Devout", "Self-Discipline", "Respect_Elders", "Obedient", "Politeness",
  "Social_Order", "National_Security", "Reciprocity", "Family_Security",
  "Clean", "Social_Power", "Wealth", "Authority", "Public_Image",
  "Ambitious", "Influential", "Capable", "Successful", "Pleasure",
  "Enjoy_Life", "Self-Indulgent", "Exciting_Life", "Varied_Life",
  "Daring", "Freedom", "Creativity", "Independent", "Choose_Own_Goals",
  "Curious", "Age_In_Months", "Sex")
```

2 Correlations

A heat map for the correlation matrix easily identifies the pattern of correlations in the simulated data.

```
ggcorr(SVI[, 2:47], label = FALSE, angle = 90, hjust = 0.1, size = 2.5,
  digits = 2) + theme(text = element_text(size = 14, family = "sans",
  color = "black", face = "bold"), axis.text.y = element_text(colour = "black",
  size = 12, face = "bold"), axis.text.x = element_text(colour = "black",
  size = 12, face = "bold", angle = 0), axis.title.x = element_text(margin = margin(15,
  0, 0, 0), size = 16), axis.title.y = element_text(margin = margin(0,
  15, 0, 0), size = 16), axis.line.x = element_blank(), axis.line.y = element_blank(),
  plot.title = element_text(size = 16, face = "bold", margin = margin(0,
  0, 20, 0), hjust = 0.5), panel.background = element_rect(fill = "white",
  linetype = 1, color = "black"), panel.grid.major = element_blank(),
  panel.grid.minor = element_blank(), plot.background = element_rect(fill = "white"),
  plot.margin = unit(c(1, 1, 1, 1), "cm"), legend.position = "bottom",
  legend.title = element_blank()) + ggtitle("Intercorrelations Among Items")
```

Intercorrelations Among Items



3 KMO Test

```
kmo_1 <- KMO(SVI[, 2:47])
kmo_1

## Kaiser-Meyer-Olkin factor adequacy
## Call: KMO(r = SVI[, 2:47])
## Overall MSA = 0.92
## MSA for each item =
##           Equality           World_Peace
##           0.92           0.93
##           Unity_With_Nature           Wisdom
```

```
##          0.85          0.95
## World_Of_Beauty      Social_Justice
##          0.87          0.92
## Broad_Minded      Protect_Enviroment
##          0.92          0.87
## Loyal              Honest
##          0.96          0.94
## Helpful            Responsible
##          0.94          0.93
## Forgiving Respect_For_Tradition
##          0.93          0.88
## Moderate           Humble
##          0.68          0.93
## Accept_My_Life      Devout
##          0.86          0.77
## Self-Discipline      Respect_Elders
##          0.95          0.94
## Obedient            Politeness
##          0.92          0.97
## Social_Order      National_Security
##          0.90          0.93
## Reciprocity        Family_Security
##          0.94          0.93
## Clean              Social_Power
##          0.93          0.82
## Wealth              Authority
##          0.84          0.87
## Public_Image        Ambitious
##          0.90          0.94
## Influential          Capable
##          0.94          0.94
## Successful           Pleasure
##          0.94          0.89
## Enjoy_Life          Self-Indulgent
##          0.87          0.80
## Exciting_Life        Varied_Life
##          0.90          0.92
## Daring              Freedom
##          0.85          0.95
## Creativity          Independent
##          0.91          0.91
## Choose_Own_Goals      Curious
##          0.93          0.91
```

4 Bartlett Test

```
bart_1 <- cortest.bartlett(SVI[, 2:47])

## R was not square, finding R from data

bart_1
```

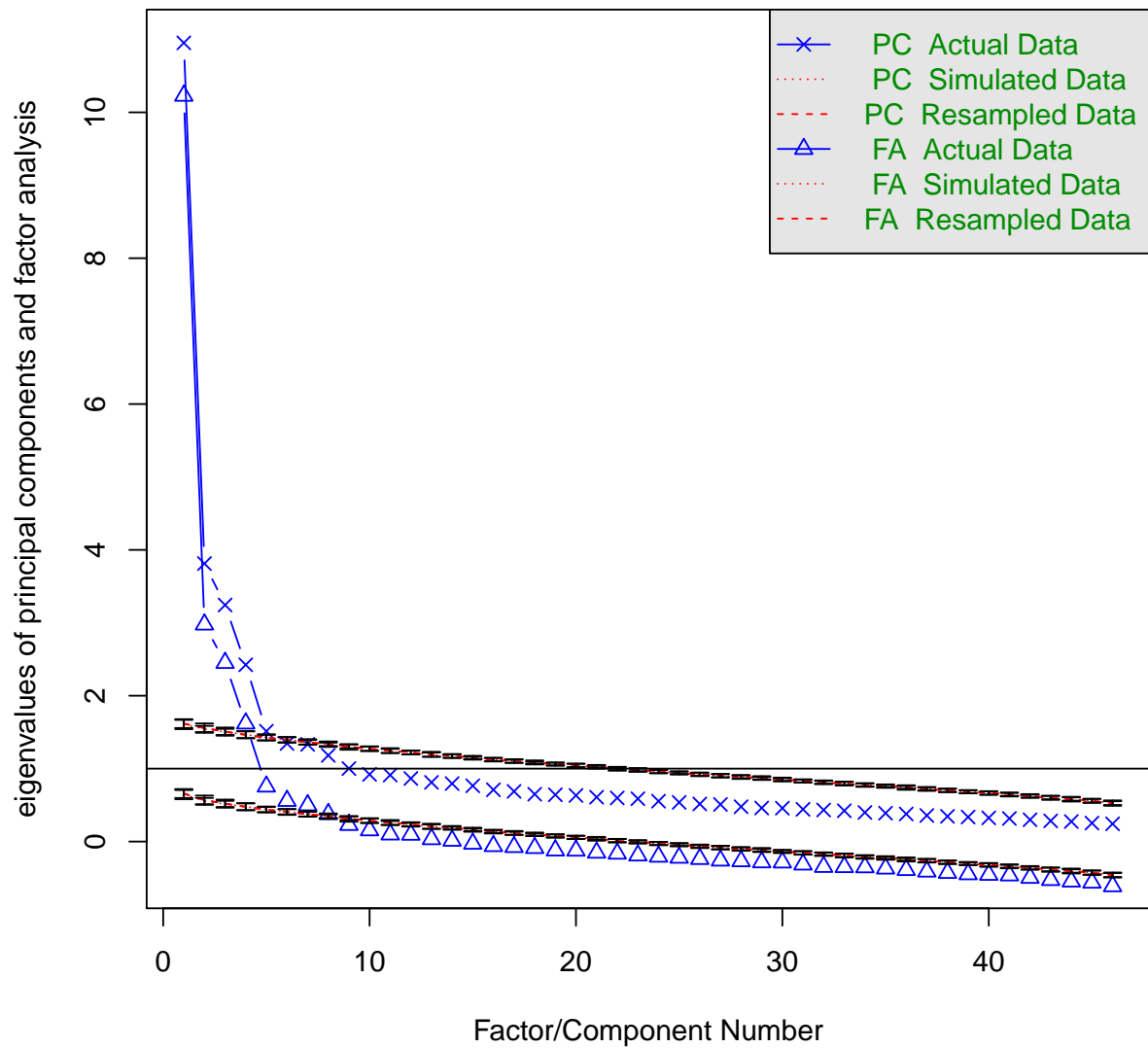
```
## $chisq
## [1] 10344
##
## $p.value
## [1] 0
##
## $df
## [1] 1035
```

5 Scree Test and Parallel Analysis

This question focuses on principal components so it is important that the "pc" option be specified in the following functions.

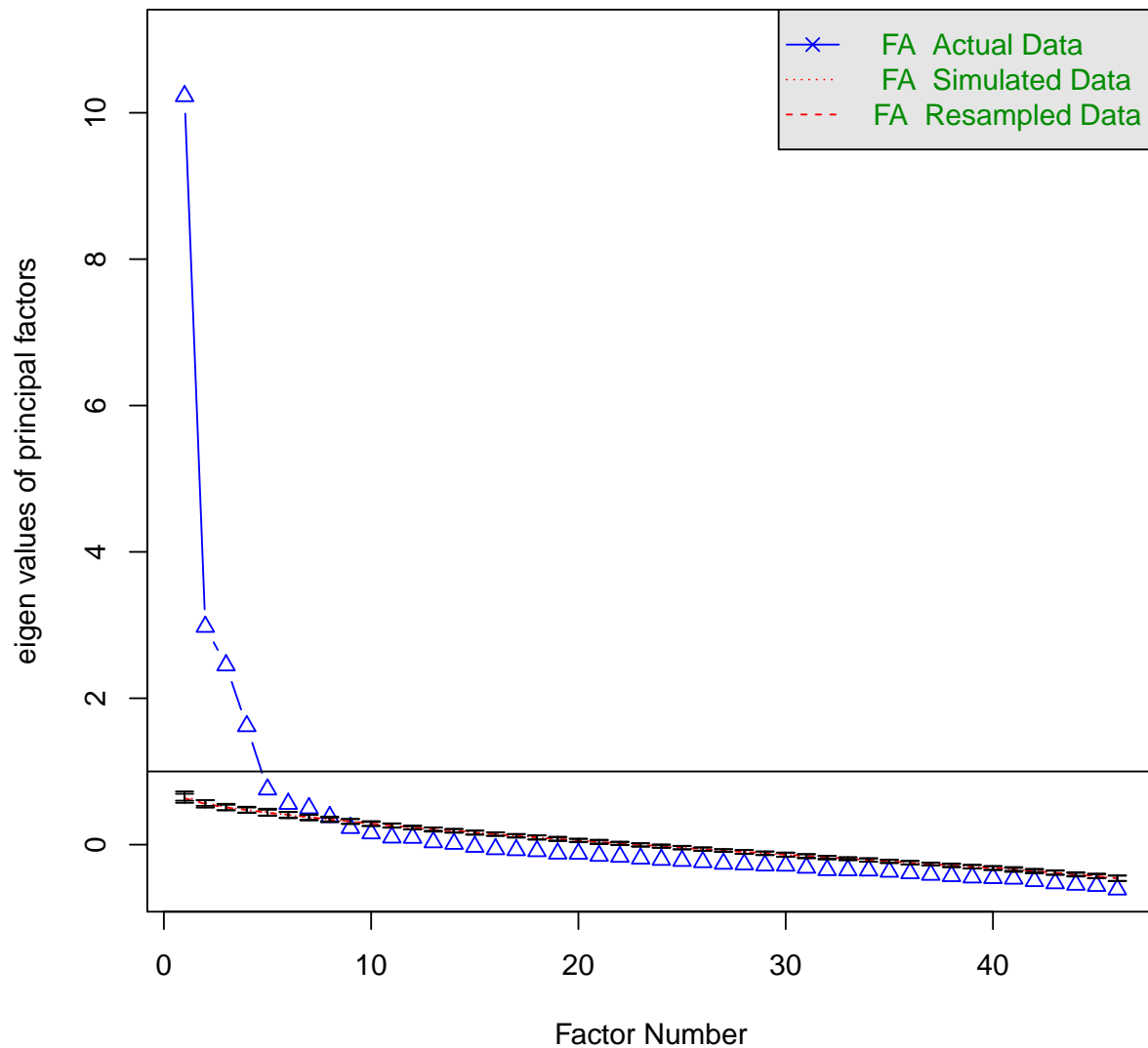
```
screes_1 <- fa.parallel(SVI[, 2:47], fa = "both", fm = "pa", error.bars = TRUE)
```

Parallel Analysis Scree Plots



```
## Parallel analysis suggests that the number of factors = 8 and the number of components = 5
scree_1 <- fa.parallel(SVI[, 2:47], fa = "fa", fm = "pa", error.bars = TRUE)
```


Parallel Analysis Scree Plots



```
## Parallel analysis suggests that the number of factors = 8 and the number of components = NA
```

```
plot_data <- scree_1$fa.values
plot_data <- as.data.frame(plot_data)
names(plot_data) <- c("eigen")
plot_data$factor <- seq(1, 46, 1)

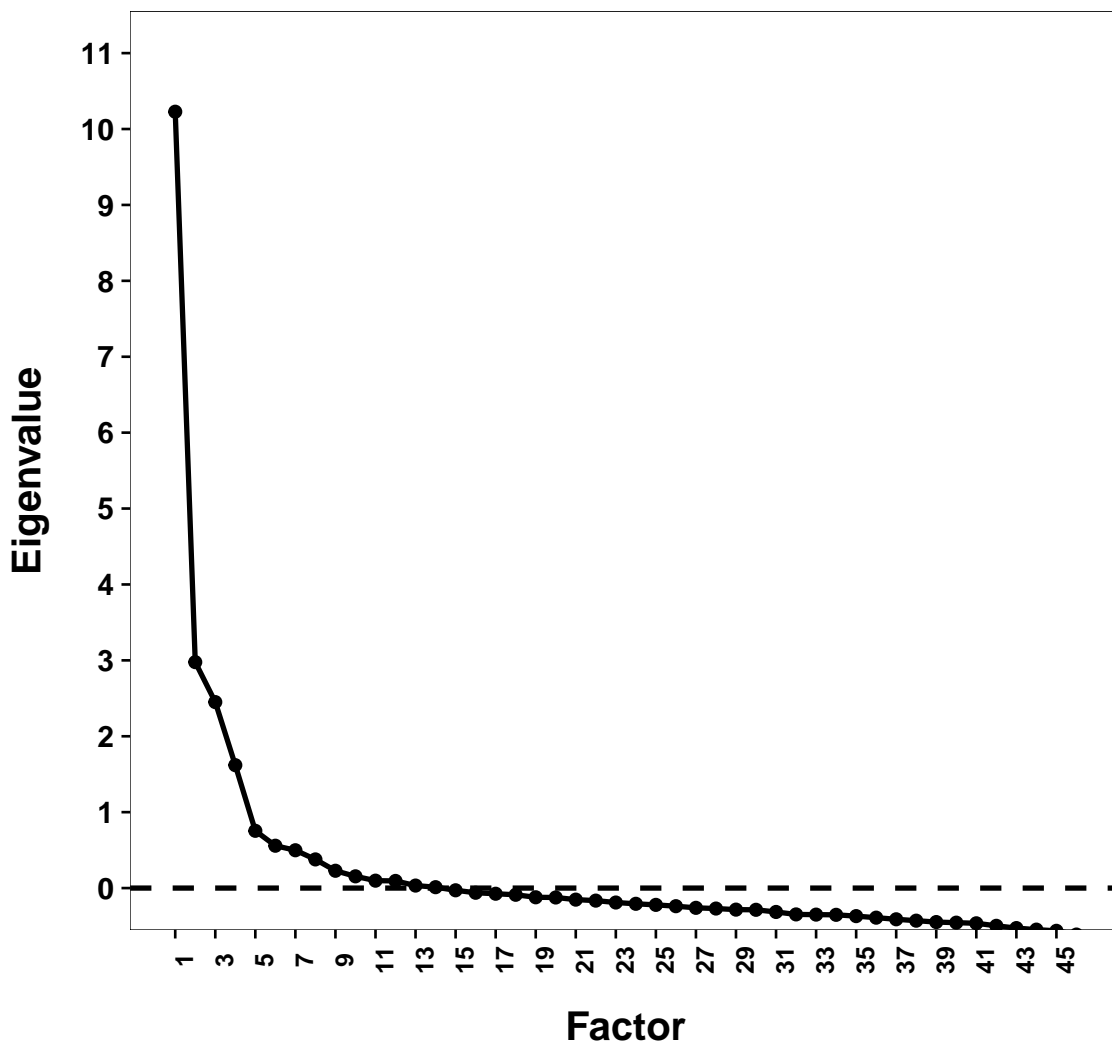
ggplot(plot_data, aes(x = factor, y = eigen)) + geom_line(size = 1) +
  geom_point(size = 2) + coord_cartesian(xlim = c(1, 46), ylim = c(0,
11)) + scale_x_continuous(breaks = c(seq(1, 46, 2))) + scale_y_continuous(breaks = seq(0,
11, 1)) + xlab("Factor") + ylab("Eigenvalue") + theme(text = element_text(size = 14,
family = "sans", color = "black", face = "bold"), axis.text.y = element_text(colour = "black",
size = 12, face = "bold"), axis.text.x = element_text(colour = "black",
```

```

size = 10, face = "bold", angle = 90), axis.title.x = element_text(margin = margin(15,
0, 0, 0), size = 16), axis.title.y = element_text(margin = margin(0,
15, 0, 0), size = 16), axis.line.x = element_blank(), axis.line.y = element_blank(),
plot.title = element_text(size = 16, face = "bold", margin = margin(0,
0, 20, 0), hjust = 0.5), panel.background = element_rect(fill = "white",
linetype = 1, color = "black"), panel.grid.major = element_blank(),
panel.grid.minor = element_blank(), plot.background = element_rect(fill = "white"),
plot.margin = unit(c(1, 1, 1, 1), "cm"), legend.position = "bottom",
legend.title = element_blank()) + geom_hline(yintercept = 0, size = 1,
linetype = 2) + ggtitle("Factor Analysis Scree Plot")

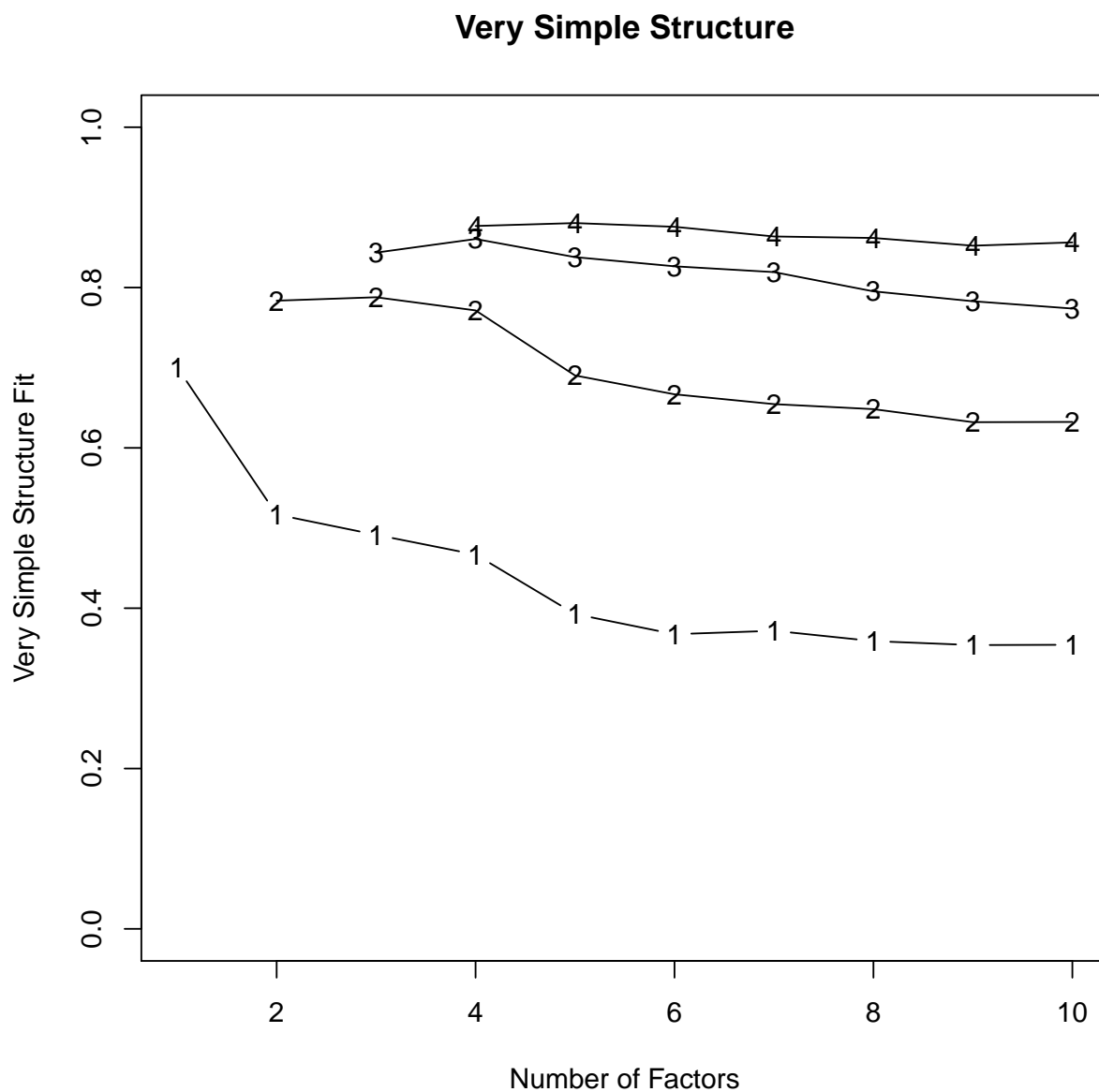
```

Factor Analysis Scree Plot



6 Very Simple Structure

```
R_1 <- cor(SVI[, 2:47])
M_1 <- vss(SVI[, 2:47], n = 10, fm = "pa", rotate = "varimax")
```



7 Velicer MAP Index

```
plot_data <- M_1$map
plot_data <- as.data.frame(plot_data)
names(plot_data) <- c("map")
plot_data$component <- seq(1, 10, 1)

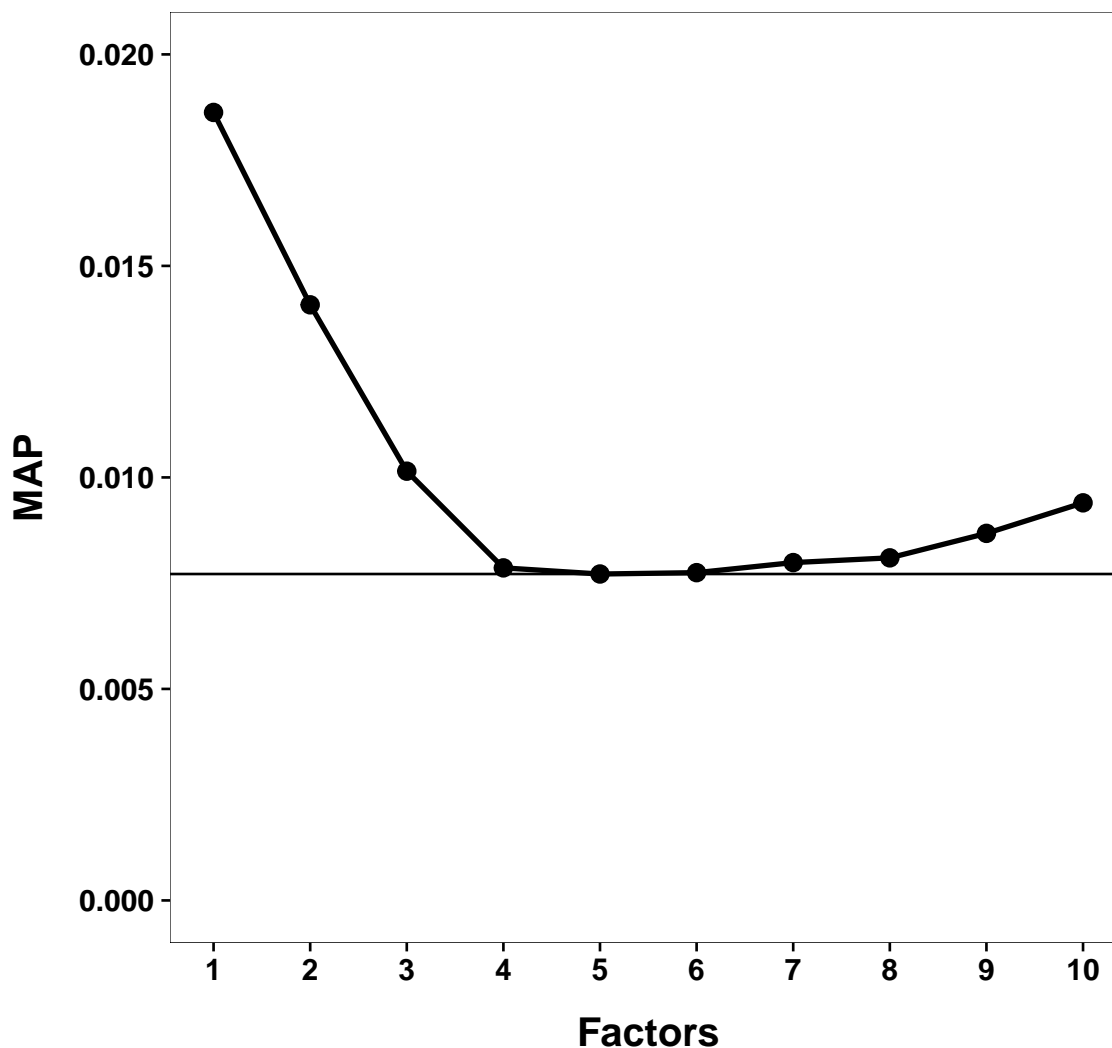
ggplot(plot_data, aes(x = component, y = map)) + geom_line(size = 1) +
  geom_point(size = 3) + coord_cartesian(xlim = c(1, 10), ylim = c(0,
```

```

0.02)) + scale_x_continuous(breaks = c(seq(1, 10, 1))) + scale_y_continuous(breaks = seq(0,
0.02, 0.005)) + xlab("Factors") + ylab("MAP") + theme(text = element_text(size = 14,
family = "sans", color = "black", face = "bold"), axis.text.y = element_text(colour = "black",
size = 12, face = "bold"), axis.text.x = element_text(colour = "black",
size = 12, face = "bold", angle = 0), axis.title.x = element_text(margin = margin(15,
0, 0, 0), size = 16), axis.title.y = element_text(margin = margin(0,
15, 0, 0), size = 16), axis.line.x = element_blank(), axis.line.y = element_blank(),
plot.title = element_text(size = 16, face = "bold", margin = margin(0,
0, 20, 0), hjust = 0.5), panel.background = element_rect(fill = "white",
linetype = 1, color = "black"), panel.grid.major = element_blank(),
panel.grid.minor = element_blank(), plot.background = element_rect(fill = "white"),
plot.margin = unit(c(1, 1, 1, 1), "cm"), legend.position = "bottom",
legend.title = element_blank()) + geom_hline(yintercept = min(plot_data$map,
size = 1, linetype = 2)) + ggtitle("MAP Index as a Function of Factors")

```

MAP Index as a Function of Factors



8 Comparison of Factor Analysis and Principal Components

Here we extract four components and four factors so that we can compare the magnitude of the loadings, communalities, etc. Because the factor analysis approach does not pretend to account for all variability, it will generally have reduced estimates (communalities, loadings, etc.) compared to a principal components analysis.

```
fit_FA_1 <- fa(SVI[, 2:47], nfactors = 4, rotate = "none", fm = "pa")
fit_PC_1 <- principal(SVI[, 2:47], nfactors = 4, rotate = "none")
fit_PC_1

## Principal Components Analysis
## Call: principal(r = SVI[, 2:47], nfactors = 4, rotate = "none")
## Standardized loadings (pattern matrix) based upon correlation matrix
##
```

	PC1	PC2	PC3	PC4	h2	u2	com
## Equality	0.55	-0.50	0.07	-0.13	0.58	0.42	2.1
## World_Peace	0.52	-0.37	-0.01	0.06	0.40	0.60	1.8
## Unity_With_Nature	0.37	-0.22	0.15	0.62	0.60	0.40	2.1
## Wisdom	0.57	0.01	0.01	0.06	0.33	0.67	1.0
## World_Of_Beauty	0.45	-0.22	0.31	0.42	0.53	0.47	3.3
## Social_Justice	0.53	-0.45	-0.01	-0.01	0.49	0.51	2.0
## Broad_Minded	0.49	-0.42	0.20	-0.16	0.49	0.51	2.6
## Protect_Enviroment	0.37	-0.30	0.25	0.45	0.49	0.51	3.4
## Loyal	0.58	-0.09	-0.21	-0.26	0.46	0.54	1.7
## Honest	0.64	-0.24	-0.20	-0.27	0.59	0.41	1.9
## Helpful	0.60	-0.43	-0.16	-0.05	0.57	0.43	2.0
## Responsible	0.65	0.02	-0.21	-0.21	0.51	0.49	1.4
## Forgiving	0.53	-0.32	-0.19	0.08	0.43	0.57	2.0
## Respect_For_Tradition	0.41	0.25	-0.37	0.39	0.52	0.48	3.6
## Moderate	0.11	0.11	-0.17	0.22	0.10	0.90	3.0
## Humble	0.51	-0.21	-0.33	0.06	0.42	0.58	2.1
## Accept_My_Life	0.30	0.12	-0.27	0.37	0.32	0.68	3.1
## Devout	0.22	0.12	-0.50	0.30	0.41	0.59	2.2
## Self-Discipline	0.58	0.07	-0.26	0.13	0.43	0.57	1.5
## Respect_Elders	0.60	0.08	-0.43	0.04	0.55	0.45	1.9
## Obedient	0.49	0.15	-0.38	0.18	0.44	0.56	2.4
## Politeness	0.62	0.05	-0.33	-0.09	0.51	0.49	1.6
## Social_Order	0.41	0.33	-0.06	0.14	0.31	0.69	2.2
## National_Security	0.52	0.25	-0.12	0.03	0.35	0.65	1.6
## Reciprocity	0.45	0.25	-0.15	0.03	0.30	0.70	1.8
## Family_Security	0.57	-0.08	-0.23	-0.22	0.43	0.57	1.7
## Clean	0.44	0.24	-0.14	0.17	0.30	0.70	2.1
## Social_Power	0.14	0.64	0.28	0.14	0.53	0.47	1.6
## Wealth	0.15	0.68	0.11	-0.21	0.54	0.46	1.3
## Authority	0.40	0.49	-0.01	0.12	0.42	0.58	2.1
## Public_Image	0.37	0.54	-0.07	0.00	0.43	0.57	1.8
## Ambitious	0.64	0.07	-0.04	-0.30	0.51	0.49	1.5
## Influential	0.53	0.21	0.07	0.04	0.34	0.66	1.4
## Capable	0.59	0.19	0.05	-0.21	0.43	0.57	1.5
## Successful	0.61	0.30	0.08	-0.32	0.57	0.43	2.1
## Pleasure	0.38	0.33	0.37	-0.16	0.42	0.58	3.3
## Enjoy_Life	0.45	0.07	0.37	-0.31	0.44	0.56	2.8
## Self-Indulgent	0.10	0.50	0.23	0.09	0.32	0.68	1.6
## Exciting_Life	0.52	0.08	0.51	-0.03	0.55	0.45	2.1

```

## Varied_Life      0.46 -0.02  0.52  0.11 0.49 0.51 2.1
## Daring           0.37  0.09  0.42  0.28 0.40 0.60 2.9
## Freedom          0.66 -0.12  0.20 -0.22 0.54 0.46 1.5
## Creativity       0.49 -0.14  0.40  0.24 0.48 0.52 2.6
## Independent      0.50  0.04  0.18 -0.18 0.32 0.68 1.6
## Choose_Own_Goals 0.54 -0.04  0.20 -0.23 0.39 0.61 1.7
## Curious          0.48 -0.12  0.43  0.28 0.50 0.50 2.8
##
##              PC1  PC2  PC3  PC4
## SS loadings    10.95 3.81 3.24 2.42
## Proportion Var   0.24 0.08 0.07 0.05
## Cumulative Var   0.24 0.32 0.39 0.44
## Proportion Explained 0.54 0.19 0.16 0.12
## Cumulative Proportion 0.54 0.72 0.88 1.00
##
## Mean item complexity = 2.1
## Test of the hypothesis that 4 components are sufficient.
##
## The root mean square of the residuals (RMSR) is 0.05
## with the empirical chi square 2647 with prob < 1.4e-181
##
## Fit based upon off diagonal values = 0.96

fit_FA_1

## Factor Analysis using method = pa
## Call: fa(r = SVI[, 2:47], nfactors = 4, rotate = "none", fm = "pa")
## Standardized loadings (pattern matrix) based upon correlation matrix
##              PA1  PA2  PA3  PA4  h2  u2 com
## Equality      0.55 -0.48  0.07 -0.13 0.549 0.45 2.1
## World_Peace    0.50 -0.33  0.00  0.05 0.361 0.64 1.8
## Unity_With_Nature 0.36 -0.21  0.16  0.57 0.523 0.48 2.2
## Wisdom         0.55  0.01  0.01  0.05 0.308 0.69 1.0
## World_Of_Beauty 0.44 -0.21  0.30  0.37 0.458 0.54 3.3
## Social_Justice 0.52 -0.42  0.00 -0.01 0.446 0.55 1.9
## Broad_Minded   0.48 -0.39  0.18 -0.16 0.442 0.56 2.5
## Protect_Enviroment 0.36 -0.27  0.24  0.38 0.405 0.59 3.5
## Loyal          0.56 -0.08 -0.20 -0.21 0.409 0.59 1.6
## Honest         0.63 -0.23 -0.20 -0.25 0.553 0.45 1.8
## Helpful        0.59 -0.41 -0.16 -0.05 0.539 0.46 2.0
## Responsible    0.63  0.03 -0.20 -0.17 0.472 0.53 1.4
## Forgiving      0.51 -0.29 -0.17  0.07 0.385 0.62 1.9
## Respect_For_Tradition 0.40  0.23 -0.33  0.37 0.458 0.54 3.6
## Moderate       0.11  0.09 -0.13  0.16 0.061 0.94 3.4
## Humble         0.50 -0.19 -0.29  0.06 0.373 0.63 2.0
## Accept_My_Life 0.29  0.11 -0.22  0.30 0.232 0.77 3.1
## Devout         0.21  0.11 -0.43  0.27 0.317 0.68 2.4
## Self-Discipline 0.57  0.07 -0.23  0.12 0.391 0.61 1.5
## Respect_Elders 0.59  0.08 -0.41  0.06 0.517 0.48 1.8
## Obedient       0.48  0.14 -0.34  0.17 0.389 0.61 2.3
## Politeness     0.61  0.05 -0.31 -0.06 0.472 0.53 1.5
## Social_Order   0.40  0.29 -0.05  0.12 0.262 0.74 2.1
## National_Security 0.50  0.22 -0.10  0.04 0.311 0.69 1.5
## Reciprocity    0.43  0.22 -0.13  0.04 0.258 0.74 1.7

```

```

## Family_Security      0.55 -0.06 -0.21 -0.18 0.380 0.62 1.5
## Clean                0.42  0.21 -0.12  0.14 0.254 0.75 1.9
## Social_Power         0.13  0.60  0.26  0.12 0.463 0.54 1.6
## Wealth               0.14  0.63  0.09 -0.18 0.464 0.54 1.3
## Authority            0.39  0.45 -0.01  0.11 0.369 0.63 2.1
## Public_Image         0.36  0.49 -0.06  0.01 0.372 0.63 1.9
## Ambitious            0.63  0.08 -0.04 -0.26 0.468 0.53 1.4
## Influential          0.51  0.19  0.06  0.04 0.305 0.69 1.3
## Capable              0.58  0.18  0.04 -0.17 0.396 0.60 1.4
## Successful           0.60  0.30  0.07 -0.29 0.535 0.46 2.0
## Pleasure             0.37  0.30  0.33 -0.14 0.351 0.65 3.3
## Enjoy_Life           0.44  0.07  0.32 -0.27 0.377 0.62 2.6
## Self-Indulgent       0.10  0.43  0.19  0.07 0.240 0.76 1.6
## Exciting_Life        0.51  0.09  0.48 -0.04 0.500 0.50 2.1
## Varied_Life          0.45 -0.01  0.47  0.08 0.435 0.57 2.1
## Daring               0.36  0.08  0.37  0.22 0.323 0.68 2.7
## Freedom              0.65 -0.11  0.18 -0.21 0.504 0.50 1.4
## Creativity           0.48 -0.12  0.37  0.20 0.419 0.58 2.4
## Independent          0.48  0.04  0.15 -0.15 0.277 0.72 1.4
## Choose_Own_Goals     0.52 -0.03  0.17 -0.19 0.343 0.66 1.5
## Curious              0.46 -0.10  0.39  0.23 0.436 0.56 2.6
##
##
##          PA1  PA2  PA3  PA4
## SS loadings      10.37 3.23 2.65 1.85
## Proportion Var    0.23 0.07 0.06 0.04
## Cumulative Var    0.23 0.30 0.35 0.39
## Proportion Explained 0.57 0.18 0.15 0.10
## Cumulative Proportion 0.57 0.75 0.90 1.00
##
## Mean item complexity = 2
## Test of the hypothesis that 4 factors are sufficient.
##
## The degrees of freedom for the null model are 1035 and the objective function was 19.86 with Chi S
## The degrees of freedom for the model are 857 and the objective function was 4.29
##
## The root mean square of the residuals (RMSR) is 0.04
## The df corrected root mean square of the residuals is 0.05
##
## The harmonic number of observations is 538 with the empirical chi square 1946 with prob < 2e-86
## The total number of observations was 538 with Likelihood Chi Square = 2221 with prob < 1.1e-121
##
## Tucker Lewis Index of factoring reliability = 0.822
## RMSEA index = 0.056 and the 90 % confidence intervals are 0.052 0.057
## BIC = -3167
## Fit based upon off diagonal values = 0.97
## Measures of factor score adequacy
##
##          PA1  PA2  PA3
## Correlation of (regression) scores with factors 0.97 0.92 0.91
## Multiple R square of scores with factors        0.95 0.85 0.82
## Minimum correlation of possible factor scores    0.90 0.70 0.64
##
##          PA4
## Correlation of (regression) scores with factors 0.88
## Multiple R square of scores with factors        0.77
## Minimum correlation of possible factor scores    0.54

```

9 Rotation

The unrotated factor loadings may not provide an easy interpretation. Rotation can assist that process. Varimax rotation is the most common orthogonal method.

```
fit_FA_2 <- fa(SVI[, 2:47], nfactors = 4, rotate = "varimax", fm = "pa",
  scores = TRUE)
fit_FA_2

## Factor Analysis using method = pa
## Call: fa(r = SVI[, 2:47], nfactors = 4, rotate = "varimax", scores = TRUE,
##   fm = "pa")
## Standardized loadings (pattern matrix) based upon correlation matrix
##
```

	PA1	PA2	PA3	PA4	h2	u2	com
## Equality	0.64	-0.15	0.34	-0.03	0.549	0.45	1.7
## World_Peace	0.46	-0.11	0.34	0.14	0.361	0.64	2.2
## Unity_With_Nature	0.01	-0.11	0.64	0.31	0.523	0.48	1.5
## Wisdom	0.38	0.19	0.26	0.25	0.308	0.69	3.2
## World_Of_Beauty	0.15	0.01	0.65	0.14	0.458	0.54	1.2
## Social_Justice	0.55	-0.17	0.33	0.09	0.446	0.55	1.9
## Broad_Minded	0.55	-0.05	0.35	-0.12	0.442	0.56	1.8
## Protect_Enviroment	0.12	-0.10	0.60	0.13	0.405	0.59	1.2
## Loyal	0.59	0.10	0.01	0.21	0.409	0.59	1.3
## Honest	0.72	0.00	0.06	0.18	0.553	0.45	1.1
## Helpful	0.64	-0.19	0.24	0.20	0.539	0.46	1.7
## Responsible	0.59	0.20	0.03	0.30	0.472	0.53	1.7
## Forgiving	0.48	-0.15	0.24	0.28	0.385	0.62	2.4
## Respect_For_Tradition	0.07	0.12	0.10	0.66	0.458	0.54	1.1
## Moderate	-0.02	0.03	0.03	0.24	0.061	0.94	1.1
## Humble	0.45	-0.11	0.11	0.37	0.373	0.63	2.2
## Accept_My_Life	0.05	0.04	0.12	0.46	0.232	0.77	1.2
## Devout	0.05	-0.06	-0.06	0.55	0.317	0.68	1.1
## Self-Discipline	0.37	0.14	0.14	0.47	0.391	0.61	2.3
## Respect_Elders	0.45	0.09	-0.01	0.56	0.517	0.48	2.0
## Obedient	0.27	0.11	0.03	0.55	0.389	0.61	1.6
## Politeness	0.52	0.14	0.00	0.43	0.472	0.53	2.1
## Social_Order	0.13	0.33	0.11	0.35	0.262	0.74	2.5
## National_Security	0.29	0.31	0.09	0.35	0.311	0.69	3.1
## Reciprocity	0.24	0.27	0.05	0.35	0.258	0.74	2.8
## Family_Security	0.56	0.09	0.01	0.24	0.380	0.62	1.4
## Clean	0.18	0.24	0.12	0.39	0.254	0.75	2.3
## Social_Power	-0.23	0.62	0.10	0.13	0.463	0.54	1.4
## Wealth	-0.05	0.65	-0.18	0.08	0.464	0.54	1.2
## Authority	0.06	0.48	0.08	0.36	0.369	0.63	2.0
## Public_Image	0.09	0.50	-0.04	0.33	0.372	0.63	1.8
## Ambitious	0.58	0.32	0.06	0.15	0.468	0.53	1.7
## Influential	0.28	0.35	0.21	0.25	0.305	0.69	3.5
## Capable	0.45	0.40	0.10	0.16	0.396	0.60	2.4
## Successful	0.48	0.54	0.03	0.12	0.535	0.46	2.1
## Pleasure	0.18	0.53	0.18	-0.06	0.351	0.65	1.5
## Enjoy_Life	0.39	0.39	0.20	-0.17	0.377	0.62	2.9


```

## Self-Indulgent      -0.16  0.45  0.07  0.08 0.240 0.76 1.3
## Exciting_Life       0.29  0.44  0.46 -0.10 0.500 0.50 2.8
## Varied_Life         0.22  0.31  0.53 -0.08 0.435 0.57 2.0
## Daring              0.05  0.29  0.49  0.06 0.323 0.68 1.7
## Freedom             0.60  0.25  0.29  0.00 0.504 0.50 1.8
## Creativity          0.23  0.16  0.58  0.03 0.419 0.58 1.5
## Independent         0.39  0.29  0.20  0.02 0.277 0.72 2.4
## Choose_Own_Goals    0.47  0.26  0.22 -0.02 0.343 0.66 2.0
## Curious             0.19  0.18  0.61  0.04 0.436 0.56 1.4
##
##
##          PA1  PA2  PA3  PA4
## SS loadings      6.73 3.91 3.74 3.72
## Proportion Var    0.15 0.09 0.08 0.08
## Cumulative Var    0.15 0.23 0.31 0.39
## Proportion Explained 0.37 0.22 0.21 0.21
## Cumulative Proportion 0.37 0.59 0.79 1.00
##
## Mean item complexity = 1.9
## Test of the hypothesis that 4 factors are sufficient.
##
## The degrees of freedom for the null model are 1035 and the objective function was 19.86 with Chi S
## The degrees of freedom for the model are 857 and the objective function was 4.29
##
## The root mean square of the residuals (RMSR) is 0.04
## The df corrected root mean square of the residuals is 0.05
##
## The harmonic number of observations is 538 with the empirical chi square 1946 with prob < 2e-86
## The total number of observations was 538 with Likelihood Chi Square = 2221 with prob < 1.1e-121
##
## Tucker Lewis Index of factoring reliability = 0.822
## RMSEA index = 0.056 and the 90 % confidence intervals are 0.052 0.057
## BIC = -3167
## Fit based upon off diagonal values = 0.97
## Measures of factor score adequacy
##
##          PA1  PA2  PA3
## Correlation of (regression) scores with factors 0.94 0.92 0.91
## Multiple R square of scores with factors        0.88 0.85 0.83
## Minimum correlation of possible factor scores    0.77 0.71 0.66
##
##          PA4
## Correlation of (regression) scores with factors 0.91
## Multiple R square of scores with factors        0.82
## Minimum correlation of possible factor scores    0.64

fa.sort(fit_FA_2, polar = FALSE)

## Factor Analysis using method = pa
## Call: fa(r = SVI[, 2:47], nfactors = 4, rotate = "varimax", scores = TRUE,
##      fm = "pa")
## Standardized loadings (pattern matrix) based upon correlation matrix
##
##          PA1  PA2  PA3  PA4  h2  u2 com
## Honest      0.72  0.00  0.06  0.18 0.553 0.45 1.1
## Helpful     0.64 -0.19  0.24  0.20 0.539 0.46 1.7
## Equality    0.64 -0.15  0.34 -0.03 0.549 0.45 1.7
## Freedom     0.60  0.25  0.29  0.00 0.504 0.50 1.8

```

```

## Loyal      0.59  0.10  0.01  0.21  0.409  0.59  1.3
## Responsible 0.59  0.20  0.03  0.30  0.472  0.53  1.7
## Ambitious   0.58  0.32  0.06  0.15  0.468  0.53  1.7
## Family_Security 0.56  0.09  0.01  0.24  0.380  0.62  1.4
## Broad_Minded 0.55 -0.05  0.35 -0.12  0.442  0.56  1.8
## Social_Justice 0.55 -0.17  0.33  0.09  0.446  0.55  1.9
## Politeness  0.52  0.14  0.00  0.43  0.472  0.53  2.1
## Forgiving   0.48 -0.15  0.24  0.28  0.385  0.62  2.4
## Choose_Own_Goals 0.47  0.26  0.22 -0.02  0.343  0.66  2.0
## World_Peace  0.46 -0.11  0.34  0.14  0.361  0.64  2.2
## Humble      0.45 -0.11  0.11  0.37  0.373  0.63  2.2
## Capable     0.45  0.40  0.10  0.16  0.396  0.60  2.4
## Independent 0.39  0.29  0.20  0.02  0.277  0.72  2.4
## Enjoy_Life  0.39  0.39  0.20 -0.17  0.377  0.62  2.9
## Wisdom      0.38  0.19  0.26  0.25  0.308  0.69  3.2
## Wealth      -0.05  0.65 -0.18  0.08  0.464  0.54  1.2
## Social_Power -0.23  0.62  0.10  0.13  0.463  0.54  1.4
## Successful  0.48  0.54  0.03  0.12  0.535  0.46  2.1
## Pleasure    0.18  0.53  0.18 -0.06  0.351  0.65  1.5
## Public_Image 0.09  0.50 -0.04  0.33  0.372  0.63  1.8
## Authority   0.06  0.48  0.08  0.36  0.369  0.63  2.0
## Self-Indulgent -0.16  0.45  0.07  0.08  0.240  0.76  1.3
## Influential 0.28  0.35  0.21  0.25  0.305  0.69  3.5
## World_Of_Beauty 0.15  0.01  0.65  0.14  0.458  0.54  1.2
## Unity_With_Nature 0.01 -0.11  0.64  0.31  0.523  0.48  1.5
## Curious     0.19  0.18  0.61  0.04  0.436  0.56  1.4
## Protect_Enviroment 0.12 -0.10  0.60  0.13  0.405  0.59  1.2
## Creativity  0.23  0.16  0.58  0.03  0.419  0.58  1.5
## Varied_Life 0.22  0.31  0.53 -0.08  0.435  0.57  2.0
## Daring      0.05  0.29  0.49  0.06  0.323  0.68  1.7
## Exciting_Life 0.29  0.44  0.46 -0.10  0.500  0.50  2.8
## Respect_For_Tradition 0.07  0.12  0.10  0.66  0.458  0.54  1.1
## Respect_Elders 0.45  0.09 -0.01  0.56  0.517  0.48  2.0
## Devout      0.05 -0.06 -0.06  0.55  0.317  0.68  1.1
## Obedient    0.27  0.11  0.03  0.55  0.389  0.61  1.6
## Self-Discipline 0.37  0.14  0.14  0.47  0.391  0.61  2.3
## Accept_My_Life 0.05  0.04  0.12  0.46  0.232  0.77  1.2
## Clean       0.18  0.24  0.12  0.39  0.254  0.75  2.3
## National_Security 0.29  0.31  0.09  0.35  0.311  0.69  3.1
## Reciprocity 0.24  0.27  0.05  0.35  0.258  0.74  2.8
## Social_Order 0.13  0.33  0.11  0.35  0.262  0.74  2.5
## Moderate    -0.02  0.03  0.03  0.24  0.061  0.94  1.1
##
##
## PA1 PA2 PA3 PA4
## SS loadings 6.73 3.91 3.74 3.72
## Proportion Var 0.15 0.09 0.08 0.08
## Cumulative Var 0.15 0.23 0.31 0.39
## Proportion Explained 0.37 0.22 0.21 0.21
## Cumulative Proportion 0.37 0.59 0.79 1.00
##
## Mean item complexity = 1.9
## Test of the hypothesis that 4 factors are sufficient.
##
## The degrees of freedom for the null model are 1035 and the objective function was 19.86 with Chi S

```

```
## The degrees of freedom for the model are 857 and the objective function was 4.29
##
## The root mean square of the residuals (RMSR) is 0.04
## The df corrected root mean square of the residuals is 0.05
##
## The harmonic number of observations is 538 with the empirical chi square 1946 with prob < 2e-86
## The total number of observations was 538 with Likelihood Chi Square = 2221 with prob < 1.1e-121
##
## Tucker Lewis Index of factoring reliability = 0.822
## RMSEA index = 0.056 and the 90 % confidence intervals are 0.052 0.057
## BIC = -3167
## Fit based upon off diagonal values = 0.97
## Measures of factor score adequacy
##
## Correlation of (regression) scores with factors PA1 PA2 PA3
## Multiple R square of scores with factors 0.94 0.92 0.91
## Minimum correlation of possible factor scores 0.88 0.85 0.83
## Correlation of (regression) scores with factors PA4
## Multiple R square of scores with factors 0.77 0.71 0.66
## Minimum correlation of possible factor scores 0.91
## Multiple R square of scores with factors 0.82
## Minimum correlation of possible factor scores 0.64
```

10 Rotation Transformation Matrix

The transformation matrix that defines the location of the new factor locations relative to the unrotated factors can be found by matrix algebra with the rotated and unrotated loading matrices.

```
# Calculate the transformation matrix.
L1 <- as.matrix(fit_FA_1$loadings[, 1:4])
L2 <- as.matrix(fit_FA_2$loadings[, 1:4])
W <- solve(t(L1) %*% L1) %*% t(L1) %*% L2
W

##          PA1      PA2      PA3      PA4
## PA1  0.7403  0.3418  0.4106  0.4081
## PA2 -0.3650  0.8289 -0.3146  0.2843
## PA3 -0.1708  0.3873  0.6313 -0.6498
## PA4 -0.5381 -0.2148  0.5778  0.5748

acos(W) * 180/pi

##          PA1      PA2      PA3      PA4
## PA1  42.24  70.01  65.76  65.92
## PA2 111.41  34.02 108.33  73.49
## PA3  99.83  67.22  50.85 130.53
## PA4 122.56 102.40  54.70  54.91
```

11 Factor Scores

Scores on the underlying common factors can be obtained in much the same way as in principal components analysis. The key difference is that variables are assumed to be

measured with error in factor analysis. These are often referred to as regression-based factor scores. Because they are estimated, not exact calculations, they can have small correlations despite the orthogonal nature of the factors.

```
cor(fit_FA_2$scores)

##          PA1      PA2      PA3      PA4
## PA1 1.00000 0.01892 0.0664423 0.0629665
## PA2 0.01892 1.00000 0.0176323 0.0350169
## PA3 0.06644 0.01763 1.0000000 -0.0008299
## PA4 0.06297 0.03502 -0.0008299 1.0000000

describe(fit_FA_2$scores)

##      vars  n mean  sd median trimmed  mad   min  max range
## PA1     1 538    0 0.94   0.09    0.08 0.91 -4.45  2.11  6.56
## PA2     2 538    0 0.92  -0.01    0.00 0.85 -4.08  2.66  6.74
## PA3     3 538    0 0.91   0.03    0.04 0.86 -3.34  2.45  5.80
## PA4     4 538    0 0.91  -0.01    0.02 0.86 -3.44  2.69  6.13
##      skew kurtosis  se
## PA1 -1.00      1.75 0.04
## PA2 -0.11      0.49 0.04
## PA3 -0.38      0.32 0.04
## PA4 -0.31      0.77 0.04
```

12 Orthogonal Rotation Methods

In addition to varimax, there are several other orthogonal rotation methods. They typically will agree with varimax and each other.

```
fit_FA_3 <- fa(SVI[, 2:47], nfactors = 4, rotate = "quartimax", fm = "pa")
fit_FA_3

## Factor Analysis using method = pa
## Call: fa(r = SVI[, 2:47], nfactors = 4, rotate = "quartimax", fm = "pa")
## Standardized loadings (pattern matrix) based upon correlation matrix
##
##          PA1  PA2  PA4  PA3   h2   u2 com
## Equality      0.62 -0.28 0.24 -0.18 0.549 0.45 1.9
## World_Peace    0.50 -0.19 0.26 0.02 0.361 0.64 1.8
## Unity_With_Nature 0.17 -0.10 0.64 0.27 0.523 0.48 1.5
## Wisdom         0.48 0.14 0.21 0.11 0.308 0.69 1.7
## World_Of_Beauty 0.27 -0.02 0.62 0.05 0.458 0.54 1.4
## Social_Justice 0.56 -0.26 0.25 -0.04 0.446 0.55 1.9
## Broad_Minded   0.53 -0.18 0.25 -0.26 0.442 0.56 2.2
## Protect_Enviroment 0.21 -0.12 0.58 0.07 0.405 0.59 1.4
## Loyal          0.63 0.01 -0.08 0.05 0.409 0.59 1.0
## Honest         0.73 -0.11 -0.05 0.00 0.553 0.45 1.1
## Helpful        0.66 -0.28 0.15 0.05 0.539 0.46 1.5
## Responsible    0.66 0.12 -0.05 0.12 0.472 0.53 1.1
## Forgiving      0.53 -0.21 0.17 0.16 0.385 0.62 1.7
## Respect_For_Tradition 0.27 0.17 0.11 0.59 0.458 0.54 1.7
## Moderate       0.05 0.06 0.04 0.23 0.061 0.94 1.3
## Humble         0.53 -0.15 0.05 0.26 0.373 0.63 1.7
```

```

## Accept_My_Life      0.19  0.07  0.12  0.42 0.232 0.77 1.7
## Devout              0.17 -0.01 -0.05  0.53 0.317 0.68 1.2
## Self-Discipline     0.51  0.11  0.09  0.33 0.391 0.61 1.9
## Respect_Elders      0.58  0.07 -0.06  0.42 0.517 0.48 1.9
## Obedient            0.42  0.12  0.01  0.45 0.389 0.61 2.1
## Politeness          0.62  0.09 -0.06  0.27 0.472 0.53 1.4
## Social_Order         0.28  0.34  0.10  0.25 0.262 0.74 3.0
## National_Security   0.42  0.28  0.06  0.22 0.311 0.69 2.4
## Reciprocity         0.37  0.26  0.02  0.23 0.258 0.74 2.6
## Family_Security     0.61  0.02 -0.07  0.08 0.380 0.62 1.1
## Clean               0.32  0.24  0.10  0.29 0.254 0.75 3.1
## Social_Power        -0.08  0.66  0.14  0.08 0.463 0.54 1.2
## Wealth              0.05  0.66 -0.17  0.00 0.464 0.54 1.1
## Authority           0.24  0.49  0.08  0.25 0.369 0.63 2.1
## Public_Image        0.24  0.51 -0.04  0.23 0.372 0.63 1.9
## Ambitious           0.64  0.22 -0.03 -0.04 0.468 0.53 1.2
## Influential         0.41  0.31  0.17  0.11 0.305 0.69 2.4
## Capable             0.54  0.33  0.04 -0.02 0.396 0.60 1.7
## Successful          0.57  0.45 -0.04 -0.08 0.535 0.46 2.0
## Pleasure            0.26  0.47  0.15 -0.19 0.351 0.65 2.2
## Enjoy_Life          0.41  0.29  0.14 -0.33 0.377 0.62 3.0
## Self-Indulgent      -0.05  0.48  0.09  0.04 0.240 0.76 1.1
## Exciting_Life       0.37  0.35  0.41 -0.26 0.500 0.50 3.7
## Varied_Life         0.30  0.24  0.49 -0.21 0.435 0.57 2.6
## Daring              0.17  0.26  0.47 -0.03 0.323 0.68 1.9
## Freedom             0.64  0.13  0.20 -0.20 0.504 0.50 1.5
## Creativity          0.33  0.10  0.54 -0.09 0.419 0.58 1.8
## Independent         0.45  0.20  0.14 -0.13 0.277 0.72 1.8
## Choose_Own_Goals    0.51  0.16  0.15 -0.19 0.343 0.66 1.7
## Curious             0.30  0.12  0.57 -0.07 0.436 0.56 1.6
##
##
##          PA1  PA2  PA4  PA3
## SS loadings      9.03 3.54 3.05 2.48
## Proportion Var   0.20 0.08 0.07 0.05
## Cumulative Var   0.20 0.27 0.34 0.39
## Proportion Explained 0.50 0.20 0.17 0.14
## Cumulative Proportion 0.50 0.69 0.86 1.00
##
## Mean item complexity = 1.8
## Test of the hypothesis that 4 factors are sufficient.
##
## The degrees of freedom for the null model are 1035 and the objective function was 19.86 with Chi S
## The degrees of freedom for the model are 857 and the objective function was 4.29
##
## The root mean square of the residuals (RMSR) is 0.04
## The df corrected root mean square of the residuals is 0.05
##
## The harmonic number of observations is 538 with the empirical chi square 1946 with prob < 2e-86
## The total number of observations was 538 with Likelihood Chi Square = 2221 with prob < 1.1e-121
##
## Tucker Lewis Index of factoring reliability = 0.822
## RMSEA index = 0.056 and the 90 % confidence intervals are 0.052 0.057
## BIC = -3167
## Fit based upon off diagonal values = 0.97

```

```

## Measures of factor score adequacy
##
## Correlation of (regression) scores with factors    PA1  PA2  PA4
## Multiple R square of scores with factors          0.96 0.92 0.90
## Minimum correlation of possible factor scores      0.85 0.70 0.63
##
## Correlation of (regression) scores with factors    PA3
## Correlation of (regression) scores with factors    0.89
## Multiple R square of scores with factors          0.79
## Minimum correlation of possible factor scores      0.59

fa.sort(fit_FA_3, polar = FALSE)

## Factor Analysis using method = pa
## Call: fa(r = SVI[, 2:47], nfactors = 4, rotate = "quartimax", fm = "pa")
## Standardized loadings (pattern matrix) based upon correlation matrix
##
##          PA1    PA2    PA4    PA3    h2    u2 com
## Honest      0.73 -0.11 -0.05    0.00 0.553 0.45 1.1
## Responsible 0.66  0.12 -0.05    0.12 0.472 0.53 1.1
## Helpful      0.66 -0.28  0.15    0.05 0.539 0.46 1.5
## Ambitious    0.64  0.22 -0.03   -0.04 0.468 0.53 1.2
## Freedom      0.64  0.13  0.20   -0.20 0.504 0.50 1.5
## Loyal        0.63  0.01 -0.08    0.05 0.409 0.59 1.0
## Politeness   0.62  0.09 -0.06    0.27 0.472 0.53 1.4
## Equality     0.62 -0.28  0.24   -0.18 0.549 0.45 1.9
## Family_Security 0.61  0.02 -0.07    0.08 0.380 0.62 1.1
## Respect_Elders 0.58  0.07 -0.06    0.42 0.517 0.48 1.9
## Successful   0.57  0.45 -0.04   -0.08 0.535 0.46 2.0
## Social_Justice 0.56 -0.26  0.25   -0.04 0.446 0.55 1.9
## Capable      0.54  0.33  0.04   -0.02 0.396 0.60 1.7
## Forgiving    0.53 -0.21  0.17    0.16 0.385 0.62 1.7
## Humble       0.53 -0.15  0.05    0.26 0.373 0.63 1.7
## Broad_Minded 0.53 -0.18  0.25   -0.26 0.442 0.56 2.2
## Choose_Own_Goals 0.51  0.16  0.15   -0.19 0.343 0.66 1.7
## Self-Discipline 0.51  0.11  0.09    0.33 0.391 0.61 1.9
## World_Peace  0.50 -0.19  0.26    0.02 0.361 0.64 1.8
## Wisdom       0.48  0.14  0.21    0.11 0.308 0.69 1.7
## Independent  0.45  0.20  0.14   -0.13 0.277 0.72 1.8
## National_Security 0.42  0.28  0.06    0.22 0.311 0.69 2.4
## Enjoy_Life   0.41  0.29  0.14   -0.33 0.377 0.62 3.0
## Influential  0.41  0.31  0.17    0.11 0.305 0.69 2.4
## Reciprocity  0.37  0.26  0.02    0.23 0.258 0.74 2.6
## Clean        0.32  0.24  0.10    0.29 0.254 0.75 3.1
## Wealth       0.05  0.66 -0.17    0.00 0.464 0.54 1.1
## Social_Power -0.08  0.66  0.14    0.08 0.463 0.54 1.2
## Public_Image 0.24  0.51 -0.04    0.23 0.372 0.63 1.9
## Authority    0.24  0.49  0.08    0.25 0.369 0.63 2.1
## Self-Indulgent -0.05  0.48  0.09    0.04 0.240 0.76 1.1
## Pleasure     0.26  0.47  0.15   -0.19 0.351 0.65 2.2
## Social_Order 0.28  0.34  0.10    0.25 0.262 0.74 3.0
## Unity_With_Nature 0.17 -0.10  0.64    0.27 0.523 0.48 1.5
## World_Of_Beauty 0.27 -0.02  0.62    0.05 0.458 0.54 1.4
## Protect_Enviroment 0.21 -0.12  0.58    0.07 0.405 0.59 1.4
## Curious      0.30  0.12  0.57   -0.07 0.436 0.56 1.6
## Creativity   0.33  0.10  0.54   -0.09 0.419 0.58 1.8

```

```

## Varied_Life      0.30  0.24  0.49 -0.21 0.435 0.57 2.6
## Daring           0.17  0.26  0.47 -0.03 0.323 0.68 1.9
## Exciting_Life    0.37  0.35  0.41 -0.26 0.500 0.50 3.7
## Respect_For_Tradition 0.27  0.17  0.11  0.59 0.458 0.54 1.7
## Devout           0.17 -0.01 -0.05  0.53 0.317 0.68 1.2
## Obedient         0.42  0.12  0.01  0.45 0.389 0.61 2.1
## Accept_My_Life   0.19  0.07  0.12  0.42 0.232 0.77 1.7
## Moderate         0.05  0.06  0.04  0.23 0.061 0.94 1.3
##
##               PA1  PA2  PA4  PA3
## SS loadings    9.03 3.54 3.05 2.48
## Proportion Var 0.20 0.08 0.07 0.05
## Cumulative Var 0.20 0.27 0.34 0.39
## Proportion Explained 0.50 0.20 0.17 0.14
## Cumulative Proportion 0.50 0.69 0.86 1.00
##
## Mean item complexity = 1.8
## Test of the hypothesis that 4 factors are sufficient.
##
## The degrees of freedom for the null model are 1035 and the objective function was 19.86 with Chi S
## The degrees of freedom for the model are 857 and the objective function was 4.29
##
## The root mean square of the residuals (RMSR) is 0.04
## The df corrected root mean square of the residuals is 0.05
##
## The harmonic number of observations is 538 with the empirical chi square 1946 with prob < 2e-86
## The total number of observations was 538 with Likelihood Chi Square = 2221 with prob < 1.1e-121
##
## Tucker Lewis Index of factoring reliability = 0.822
## RMSEA index = 0.056 and the 90 % confidence intervals are 0.052 0.057
## BIC = -3167
## Fit based upon off diagonal values = 0.97
## Measures of factor score adequacy
##
##               PA1  PA2  PA4
## Correlation of (regression) scores with factors 0.96 0.92 0.90
## Multiple R square of scores with factors 0.93 0.85 0.82
## Minimum correlation of possible factor scores 0.85 0.70 0.63
##
##               PA3
## Correlation of (regression) scores with factors 0.89
## Multiple R square of scores with factors 0.79
## Minimum correlation of possible factor scores 0.59

```

```

fit_FA_4 <- fa(SVI[, 2:47], nfactors = 4, rotate = "equamax", fm = "pa")
fit_FA_4

## Factor Analysis using method = pa
## Call: fa(r = SVI[, 2:47], nfactors = 4, rotate = "equamax", fm = "pa")
## Standardized loadings (pattern matrix) based upon correlation matrix
##
##               PA1  PA2  PA4  PA3  h2  u2 com
## Equality      0.62 -0.28 0.24 -0.18 0.549 0.45 1.9
## World_Peace   0.50 -0.19 0.26  0.02 0.361 0.64 1.8
## Unity_With_Nature 0.17 -0.10 0.64  0.27 0.523 0.48 1.5
## Wisdom        0.48  0.14 0.21  0.11 0.308 0.69 1.7

```

```

## World_Of_Beauty      0.27 -0.02  0.62  0.05 0.458 0.54 1.4
## Social_Justice       0.56 -0.26  0.25 -0.04 0.446 0.55 1.9
## Broad_Minded        0.53 -0.18  0.25 -0.26 0.442 0.56 2.2
## Protect_Enviroment  0.21 -0.12  0.58  0.07 0.405 0.59 1.4
## Loyal               0.63  0.01 -0.08  0.05 0.409 0.59 1.0
## Honest              0.73 -0.11 -0.05  0.00 0.553 0.45 1.1
## Helpful             0.66 -0.28  0.15  0.05 0.539 0.46 1.5
## Responsible         0.66  0.12 -0.05  0.12 0.472 0.53 1.1
## Forgiving           0.53 -0.21  0.17  0.16 0.385 0.62 1.7
## Respect_For_Tradition 0.27  0.17  0.11  0.59 0.458 0.54 1.7
## Moderate            0.05  0.06  0.04  0.23 0.061 0.94 1.3
## Humble              0.53 -0.15  0.05  0.26 0.373 0.63 1.7
## Accept_My_Life      0.19  0.07  0.12  0.42 0.232 0.77 1.7
## Devout              0.17 -0.01 -0.05  0.53 0.317 0.68 1.2
## Self-Discipline     0.51  0.11  0.09  0.33 0.391 0.61 1.9
## Respect_Elders      0.58  0.07 -0.06  0.42 0.517 0.48 1.9
## Obedient            0.42  0.12  0.01  0.45 0.389 0.61 2.1
## Politeness          0.62  0.09 -0.06  0.27 0.472 0.53 1.4
## Social_Order        0.28  0.34  0.10  0.25 0.262 0.74 3.0
## National_Security   0.42  0.28  0.06  0.22 0.311 0.69 2.4
## Reciprocity         0.37  0.26  0.02  0.23 0.258 0.74 2.6
## Family_Security     0.61  0.02 -0.07  0.08 0.380 0.62 1.1
## Clean               0.32  0.24  0.10  0.29 0.254 0.75 3.1
## Social_Power        -0.08  0.66  0.14  0.08 0.463 0.54 1.2
## Wealth              0.05  0.66 -0.17  0.00 0.464 0.54 1.1
## Authority           0.24  0.49  0.08  0.25 0.369 0.63 2.1
## Public_Image        0.24  0.51 -0.04  0.23 0.372 0.63 1.9
## Ambitious           0.64  0.22 -0.03 -0.04 0.468 0.53 1.2
## Influential         0.41  0.31  0.17  0.11 0.305 0.69 2.4
## Capable             0.54  0.33  0.04 -0.02 0.396 0.60 1.7
## Successful          0.57  0.45 -0.04 -0.08 0.535 0.46 2.0
## Pleasure            0.26  0.47  0.15 -0.19 0.351 0.65 2.2
## Enjoy_Life          0.41  0.29  0.14 -0.33 0.377 0.62 3.0
## Self-Indulgent      -0.05  0.48  0.09  0.04 0.240 0.76 1.1
## Exciting_Life       0.37  0.35  0.41 -0.26 0.500 0.50 3.7
## Varied_Life         0.30  0.24  0.49 -0.21 0.435 0.57 2.6
## Daring              0.17  0.26  0.47 -0.03 0.323 0.68 1.9
## Freedom             0.64  0.13  0.20 -0.20 0.504 0.50 1.5
## Creativity          0.33  0.10  0.54 -0.09 0.419 0.58 1.8
## Independent         0.45  0.20  0.14 -0.13 0.277 0.72 1.8
## Choose_Own_Goals    0.51  0.16  0.15 -0.19 0.343 0.66 1.7
## Curious             0.30  0.12  0.57 -0.07 0.436 0.56 1.6
##
##
## PA1 PA2 PA4 PA3
## SS loadings      9.03 3.54 3.05 2.48
## Proportion Var   0.20 0.08 0.07 0.05
## Cumulative Var   0.20 0.27 0.34 0.39
## Proportion Explained 0.50 0.20 0.17 0.14
## Cumulative Proportion 0.50 0.69 0.86 1.00
##
## Mean item complexity = 1.8
## Test of the hypothesis that 4 factors are sufficient.
##
## The degrees of freedom for the null model are 1035 and the objective function was 19.86 with Chi S

```



```

## The degrees of freedom for the model are 857 and the objective function was 4.29
##
## The root mean square of the residuals (RMSR) is 0.04
## The df corrected root mean square of the residuals is 0.05
##
## The harmonic number of observations is 538 with the empirical chi square 1946 with prob < 2e-86
## The total number of observations was 538 with Likelihood Chi Square = 2221 with prob < 1.1e-121
##
## Tucker Lewis Index of factoring reliability = 0.822
## RMSEA index = 0.056 and the 90 % confidence intervals are 0.052 0.057
## BIC = -3167
## Fit based upon off diagonal values = 0.97
## Measures of factor score adequacy
##
## Correlation of (regression) scores with factors PA1 PA2 PA4
## Multiple R square of scores with factors 0.96 0.92 0.90
## Minimum correlation of possible factor scores 0.93 0.85 0.82
##
## Correlation of (regression) scores with factors PA3
## Multiple R square of scores with factors 0.89
## Minimum correlation of possible factor scores 0.79
##
fa.sort(fit_FA_4, polar = FALSE)

## Factor Analysis using method = pa
## Call: fa(r = SVI[, 2:47], nfactors = 4, rotate = "equamax", fm = "pa")
## Standardized loadings (pattern matrix) based upon correlation matrix
##
## PA1 PA2 PA4 PA3 h2 u2 com
## Honest 0.73 -0.11 -0.05 0.00 0.553 0.45 1.1
## Responsible 0.66 0.12 -0.05 0.12 0.472 0.53 1.1
## Helpful 0.66 -0.28 0.15 0.05 0.539 0.46 1.5
## Ambitious 0.64 0.22 -0.03 -0.04 0.468 0.53 1.2
## Freedom 0.64 0.13 0.20 -0.20 0.504 0.50 1.5
## Loyal 0.63 0.01 -0.08 0.05 0.409 0.59 1.0
## Politeness 0.62 0.09 -0.06 0.27 0.472 0.53 1.4
## Equality 0.62 -0.28 0.24 -0.18 0.549 0.45 1.9
## Family_Security 0.61 0.02 -0.07 0.08 0.380 0.62 1.1
## Respect_Elders 0.58 0.07 -0.06 0.42 0.517 0.48 1.9
## Successful 0.57 0.45 -0.04 -0.08 0.535 0.46 2.0
## Social_Justice 0.56 -0.26 0.25 -0.04 0.446 0.55 1.9
## Capable 0.54 0.33 0.04 -0.02 0.396 0.60 1.7
## Forgiving 0.53 -0.21 0.17 0.16 0.385 0.62 1.7
## Humble 0.53 -0.15 0.05 0.26 0.373 0.63 1.7
## Broad_Minded 0.53 -0.18 0.25 -0.26 0.442 0.56 2.2
## Choose_Own_Goals 0.51 0.16 0.15 -0.19 0.343 0.66 1.7
## Self-Discipline 0.51 0.11 0.09 0.33 0.391 0.61 1.9
## World_Peace 0.50 -0.19 0.26 0.02 0.361 0.64 1.8
## Wisdom 0.48 0.14 0.21 0.11 0.308 0.69 1.7
## Independent 0.45 0.20 0.14 -0.13 0.277 0.72 1.8
## National_Security 0.42 0.28 0.06 0.22 0.311 0.69 2.4
## Enjoy_Life 0.41 0.29 0.14 -0.33 0.377 0.62 3.0
## Influential 0.41 0.31 0.17 0.11 0.305 0.69 2.4
## Reciprocity 0.37 0.26 0.02 0.23 0.258 0.74 2.6
## Clean 0.32 0.24 0.10 0.29 0.254 0.75 3.1

```

```

## Wealth      0.05  0.66 -0.17  0.00  0.464 0.54 1.1
## Social_Power -0.08  0.66  0.14  0.08  0.463 0.54 1.2
## Public_Image 0.24  0.51 -0.04  0.23  0.372 0.63 1.9
## Authority    0.24  0.49  0.08  0.25  0.369 0.63 2.1
## Self-Indulgent -0.05  0.48  0.09  0.04  0.240 0.76 1.1
## Pleasure     0.26  0.47  0.15 -0.19  0.351 0.65 2.2
## Social_Order 0.28  0.34  0.10  0.25  0.262 0.74 3.0
## Unity_With_Nature 0.17 -0.10  0.64  0.27  0.523 0.48 1.5
## World_Of_Beauty 0.27 -0.02  0.62  0.05  0.458 0.54 1.4
## Protect_Enviroment 0.21 -0.12  0.58  0.07  0.405 0.59 1.4
## Curious      0.30  0.12  0.57 -0.07  0.436 0.56 1.6
## Creativity    0.33  0.10  0.54 -0.09  0.419 0.58 1.8
## Varied_Life   0.30  0.24  0.49 -0.21  0.435 0.57 2.6
## Daring        0.17  0.26  0.47 -0.03  0.323 0.68 1.9
## Exciting_Life 0.37  0.35  0.41 -0.26  0.500 0.50 3.7
## Respect_For_Tradition 0.27  0.17  0.11  0.59  0.458 0.54 1.7
## Devout        0.17 -0.01 -0.05  0.53  0.317 0.68 1.2
## Obedient      0.42  0.12  0.01  0.45  0.389 0.61 2.1
## Accept_My_Life 0.19  0.07  0.12  0.42  0.232 0.77 1.7
## Moderate      0.05  0.06  0.04  0.23  0.061 0.94 1.3
##
##
##          PA1  PA2  PA4  PA3
## SS loadings      9.03 3.54 3.05 2.48
## Proportion Var    0.20 0.08 0.07 0.05
## Cumulative Var    0.20 0.27 0.34 0.39
## Proportion Explained 0.50 0.20 0.17 0.14
## Cumulative Proportion 0.50 0.69 0.86 1.00
##
## Mean item complexity = 1.8
## Test of the hypothesis that 4 factors are sufficient.
##
## The degrees of freedom for the null model are 1035 and the objective function was 19.86 with Chi S
## The degrees of freedom for the model are 857 and the objective function was 4.29
##
## The root mean square of the residuals (RMSR) is 0.04
## The df corrected root mean square of the residuals is 0.05
##
## The harmonic number of observations is 538 with the empirical chi square 1946 with prob < 2e-86
## The total number of observations was 538 with Likelihood Chi Square = 2221 with prob < 1.1e-121
##
## Tucker Lewis Index of factoring reliability = 0.822
## RMSEA index = 0.056 and the 90 % confidence intervals are 0.052 0.057
## BIC = -3167
## Fit based upon off diagonal values = 0.97
## Measures of factor score adequacy
##
##          PA1  PA2  PA4
## Correlation of (regression) scores with factors 0.96 0.92 0.90
## Multiple R square of scores with factors 0.93 0.85 0.82
## Minimum correlation of possible factor scores 0.85 0.70 0.63
##
##          PA3
## Correlation of (regression) scores with factors 0.89
## Multiple R square of scores with factors 0.79
## Minimum correlation of possible factor scores 0.59

```

```

fit_FA_5 <- fa(SVI[, 2:47], nfactors = 4, rotate = "bifactor", fm = "pa")
fit_FA_5

## Factor Analysis using method = pa
## Call: fa(r = SVI[, 2:47], nfactors = 4, rotate = "bifactor", fm = "pa")
## Standardized loadings (pattern matrix) based upon correlation matrix
##
##      PA1   PA2   PA3   PA4   h2   u2 com
## Equality      0.55 -0.47 -0.16  0.05 0.549 0.45 2.2
## World_Peace    0.49 -0.33  0.02  0.13 0.361 0.64 1.9
## Unity_With_Nature 0.33 -0.11  0.16  0.61 0.523 0.48 1.8
## Wisdom         0.55  0.00  0.08  0.05 0.308 0.69 1.1
## World_Of_Beauty 0.43 -0.09 -0.05  0.51 0.458 0.54 2.0
## Social_Justice 0.51 -0.42 -0.03  0.10 0.446 0.55 2.0
## Broad_Minded   0.50 -0.36 -0.26  0.06 0.442 0.56 2.4
## Protect_Enviroment 0.34 -0.17 -0.01  0.51 0.405 0.59 2.0
## Loyal          0.55 -0.18  0.10 -0.25 0.409 0.59 1.7
## Honest         0.62 -0.33  0.06 -0.24 0.553 0.45 1.9
## Helpful        0.56 -0.46  0.09 -0.01 0.539 0.46 2.0
## Responsible    0.62 -0.08  0.15 -0.24 0.472 0.53 1.4
## Forgiving      0.48 -0.34  0.18  0.06 0.385 0.62 2.1
## Respect_For_Tradition 0.35  0.14  0.55  0.11 0.458 0.54 1.9
## Moderate       0.09  0.06  0.22  0.05 0.061 0.94 1.6
## Humble         0.46 -0.28  0.29 -0.04 0.373 0.63 2.4
## Accept_My_Life 0.25  0.06  0.39  0.12 0.232 0.77 2.0
## Devout         0.16  0.00  0.54  0.00 0.317 0.68 1.2
## Self-Discipline 0.53 -0.01  0.32 -0.01 0.391 0.61 1.7
## Respect_Elders 0.54 -0.06  0.44 -0.16 0.517 0.48 2.1
## Obedient       0.43  0.03  0.44 -0.05 0.389 0.61 2.0
## Politeness     0.58 -0.07  0.30 -0.20 0.472 0.53 1.8
## Social_Order   0.39  0.26  0.20  0.02 0.262 0.74 2.3
## National_Security 0.49  0.17  0.20 -0.06 0.311 0.69 1.6
## Reciprocity    0.42  0.16  0.22 -0.08 0.258 0.74 1.9
## Family_Security 0.54 -0.16  0.12 -0.22 0.380 0.62 1.7
## Clean          0.40  0.16  0.26  0.02 0.254 0.75 2.1
## Social_Power   0.16  0.65 -0.02  0.09 0.463 0.54 1.2
## Wealth         0.18  0.61 -0.03 -0.25 0.464 0.54 1.5
## Authority      0.39  0.42  0.19 -0.01 0.369 0.63 2.4
## Public_Image   0.36  0.43  0.19 -0.13 0.372 0.63 2.6
## Ambitious      0.64  0.01 -0.02 -0.25 0.468 0.53 1.3
## Influential    0.52  0.18  0.06  0.02 0.305 0.69 1.3
## Capable        0.59  0.14 -0.03 -0.16 0.396 0.60 1.3
## Successful     0.63  0.24 -0.08 -0.27 0.535 0.46 1.7
## Pleasure       0.41  0.35 -0.24 -0.03 0.351 0.65 2.6
## Enjoy_Life     0.49  0.11 -0.35 -0.08 0.377 0.62 2.0
## Self-Indulgent 0.12  0.47 -0.03  0.05 0.240 0.76 1.2
## Exciting_Life  0.56  0.19 -0.34  0.19 0.500 0.50 2.2
## Varied_Life    0.49  0.12 -0.30  0.31 0.435 0.57 2.6
## Daring         0.38  0.19 -0.13  0.35 0.323 0.68 2.8
## Freedom        0.67 -0.10 -0.21 -0.05 0.504 0.50 1.3
## Creativity     0.49 -0.01 -0.17  0.38 0.419 0.58 2.2
## Independent    0.50  0.04 -0.15 -0.05 0.277 0.72 1.2
## Choose_Own_Goals 0.55 -0.02 -0.20 -0.06 0.343 0.66 1.3
## Curious        0.48  0.02 -0.17  0.42 0.436 0.56 2.2
##

```

```

##          PA1  PA2  PA3  PA4
## SS loadings      10.26 3.18 2.54 2.12
## Proportion Var    0.22 0.07 0.06 0.05
## Cumulative Var    0.22 0.29 0.35 0.39
## Proportion Explained 0.57 0.18 0.14 0.12
## Cumulative Proportion 0.57 0.74 0.88 1.00
##
## Mean item complexity = 1.9
## Test of the hypothesis that 4 factors are sufficient.
##
## The degrees of freedom for the null model are 1035 and the objective function was 19.86 with Chi S
## The degrees of freedom for the model are 857 and the objective function was 4.29
##
## The root mean square of the residuals (RMSR) is 0.04
## The df corrected root mean square of the residuals is 0.05
##
## The harmonic number of observations is 538 with the empirical chi square 1946 with prob < 2e-86
## The total number of observations was 538 with Likelihood Chi Square = 2221 with prob < 1.1e-121
##
## Tucker Lewis Index of factoring reliability = 0.822
## RMSEA index = 0.056 and the 90 % confidence intervals are 0.052 0.057
## BIC = -3167
## Fit based upon off diagonal values = 0.97
## Measures of factor score adequacy
##
##          PA1  PA2  PA3
## Correlation of (regression) scores with factors 0.97 0.92 0.90
## Multiple R square of scores with factors 0.95 0.85 0.80
## Minimum correlation of possible factor scores 0.89 0.69 0.61
##
##          PA4
## Correlation of (regression) scores with factors 0.89
## Multiple R square of scores with factors 0.79
## Minimum correlation of possible factor scores 0.58

fa.sort(fit_FA_5, polar = FALSE)

## Factor Analysis using method = pa
## Call: fa(r = SVI[, 2:47], nfactors = 4, rotate = "bifactor", fm = "pa")
## Standardized loadings (pattern matrix) based upon correlation matrix
##          PA1  PA2  PA3  PA4  h2  u2 com
## Freedom      0.67 -0.10 -0.21 -0.05 0.504 0.50 1.3
## Ambitious     0.64  0.01 -0.02 -0.25 0.468 0.53 1.3
## Successful    0.63  0.24 -0.08 -0.27 0.535 0.46 1.7
## Responsible   0.62 -0.08  0.15 -0.24 0.472 0.53 1.4
## Honest        0.62 -0.33  0.06 -0.24 0.553 0.45 1.9
## Capable       0.59  0.14 -0.03 -0.16 0.396 0.60 1.3
## Politeness    0.58 -0.07  0.30 -0.20 0.472 0.53 1.8
## Helpful       0.56 -0.46  0.09 -0.01 0.539 0.46 2.0
## Exciting_Life 0.56  0.19 -0.34  0.19 0.500 0.50 2.2
## Loyal         0.55 -0.18  0.10 -0.25 0.409 0.59 1.7
## Choose_Own_Goals 0.55 -0.02 -0.20 -0.06 0.343 0.66 1.3
## Equality      0.55 -0.47 -0.16  0.05 0.549 0.45 2.2
## Wisdom        0.55  0.00  0.08  0.05 0.308 0.69 1.1
## Respect_Elders 0.54 -0.06  0.44 -0.16 0.517 0.48 2.1
## Family_Security 0.54 -0.16  0.12 -0.22 0.380 0.62 1.7

```

```

## Self-Discipline      0.53 -0.01  0.32 -0.01 0.391 0.61 1.7
## Influential          0.52  0.18  0.06  0.02 0.305 0.69 1.3
## Social_Justice       0.51 -0.42 -0.03  0.10 0.446 0.55 2.0
## Independent          0.50  0.04 -0.15 -0.05 0.277 0.72 1.2
## Broad_Minded         0.50 -0.36 -0.26  0.06 0.442 0.56 2.4
## Creativity           0.49 -0.01 -0.17  0.38 0.419 0.58 2.2
## National_Security    0.49  0.17  0.20 -0.06 0.311 0.69 1.6
## Varied_Life          0.49  0.12 -0.30  0.31 0.435 0.57 2.6
## Enjoy_Life           0.49  0.11 -0.35 -0.08 0.377 0.62 2.0
## World_Peace          0.49 -0.33  0.02  0.13 0.361 0.64 1.9
## Forgiving            0.48 -0.34  0.18  0.06 0.385 0.62 2.1
## Curious              0.48  0.02 -0.17  0.42 0.436 0.56 2.2
## Humble               0.46 -0.28  0.29 -0.04 0.373 0.63 2.4
## Reciprocity          0.42  0.16  0.22 -0.08 0.258 0.74 1.9
## Pleasure             0.41  0.35 -0.24 -0.03 0.351 0.65 2.6
## Clean                0.40  0.16  0.26  0.02 0.254 0.75 2.1
## Social_Order         0.39  0.26  0.20  0.02 0.262 0.74 2.3
## Daring               0.38  0.19 -0.13  0.35 0.323 0.68 2.8
## Social_Power         0.16  0.65 -0.02  0.09 0.463 0.54 1.2
## Wealth               0.18  0.61 -0.03 -0.25 0.464 0.54 1.5
## Self-Indulgent       0.12  0.47 -0.03  0.05 0.240 0.76 1.2
## Public_Image         0.36  0.43  0.19 -0.13 0.372 0.63 2.6
## Authority            0.39  0.42  0.19 -0.01 0.369 0.63 2.4
## Respect_For_Tradition 0.35  0.14  0.55  0.11 0.458 0.54 1.9
## Devout               0.16  0.00  0.54  0.00 0.317 0.68 1.2
## Obedient             0.43  0.03  0.44 -0.05 0.389 0.61 2.0
## Accept_My_Life       0.25  0.06  0.39  0.12 0.232 0.77 2.0
## Moderate             0.09  0.06  0.22  0.05 0.061 0.94 1.6
## Unity_With_Nature    0.33 -0.11  0.16  0.61 0.523 0.48 1.8
## World_Of_Beauty      0.43 -0.09 -0.05  0.51 0.458 0.54 2.0
## Protect_Enviroment   0.34 -0.17 -0.01  0.51 0.405 0.59 2.0
##
##
##          PA1  PA2  PA3  PA4
## SS loadings    10.26 3.18 2.54 2.12
## Proportion Var    0.22 0.07 0.06 0.05
## Cumulative Var    0.22 0.29 0.35 0.39
## Proportion Explained 0.57 0.18 0.14 0.12
## Cumulative Proportion 0.57 0.74 0.88 1.00
##
## Mean item complexity = 1.9
## Test of the hypothesis that 4 factors are sufficient.
##
## The degrees of freedom for the null model are 1035 and the objective function was 19.86 with Chi S
## The degrees of freedom for the model are 857 and the objective function was 4.29
##
## The root mean square of the residuals (RMSR) is 0.04
## The df corrected root mean square of the residuals is 0.05
##
## The harmonic number of observations is 538 with the empirical chi square 1946 with prob < 2e-86
## The total number of observations was 538 with Likelihood Chi Square = 2221 with prob < 1.1e-121
##
## Tucker Lewis Index of factoring reliability = 0.822
## RMSEA index = 0.056 and the 90 % confidence intervals are 0.052 0.057
## BIC = -3167

```

```
## Fit based upon off diagonal values = 0.97
## Measures of factor score adequacy
##
## Correlation of (regression) scores with factors    PA1  PA2  PA3
## Multiple R square of scores with factors          0.97 0.92 0.90
## Minimum correlation of possible factor scores      0.89 0.69 0.61
##
## Correlation of (regression) scores with factors    PA4
## Multiple R square of scores with factors          0.89
## Minimum correlation of possible factor scores      0.79
##
```

13 Estimation Methods

```
fit_FA_6 <- fa(SVI[, 2:47], nfactors = 4, rotate = "varimax", fm = "pa")
fit_FA_6

## Factor Analysis using method = pa
## Call: fa(r = SVI[, 2:47], nfactors = 4, rotate = "varimax", fm = "pa")
## Standardized loadings (pattern matrix) based upon correlation matrix
##
## PA1  PA2  PA3  PA4  h2  u2 com
## Equality      0.64 -0.15  0.34 -0.03 0.549 0.45 1.7
## World_Peace   0.46 -0.11  0.34  0.14 0.361 0.64 2.2
## Unity_With_Nature 0.01 -0.11  0.64  0.31 0.523 0.48 1.5
## Wisdom        0.38  0.19  0.26  0.25 0.308 0.69 3.2
## World_Of_Beauty 0.15  0.01  0.65  0.14 0.458 0.54 1.2
## Social_Justice 0.55 -0.17  0.33  0.09 0.446 0.55 1.9
## Broad_Minded   0.55 -0.05  0.35 -0.12 0.442 0.56 1.8
## Protect_Enviroment 0.12 -0.10  0.60  0.13 0.405 0.59 1.2
## Loyal          0.59  0.10  0.01  0.21 0.409 0.59 1.3
## Honest         0.72  0.00  0.06  0.18 0.553 0.45 1.1
## Helpful        0.64 -0.19  0.24  0.20 0.539 0.46 1.7
## Responsible    0.59  0.20  0.03  0.30 0.472 0.53 1.7
## Forgiving      0.48 -0.15  0.24  0.28 0.385 0.62 2.4
## Respect_For_Tradition 0.07  0.12  0.10  0.66 0.458 0.54 1.1
## Moderate      -0.02  0.03  0.03  0.24 0.061 0.94 1.1
## Humble         0.45 -0.11  0.11  0.37 0.373 0.63 2.2
## Accept_My_Life 0.05  0.04  0.12  0.46 0.232 0.77 1.2
## Devout         0.05 -0.06 -0.06  0.55 0.317 0.68 1.1
## Self-Discipline 0.37  0.14  0.14  0.47 0.391 0.61 2.3
## Respect_Elders 0.45  0.09 -0.01  0.56 0.517 0.48 2.0
## Obedient       0.27  0.11  0.03  0.55 0.389 0.61 1.6
## Politeness     0.52  0.14  0.00  0.43 0.472 0.53 2.1
## Social_Order   0.13  0.33  0.11  0.35 0.262 0.74 2.5
## National_Security 0.29  0.31  0.09  0.35 0.311 0.69 3.1
## Reciprocity    0.24  0.27  0.05  0.35 0.258 0.74 2.8
## Family_Security 0.56  0.09  0.01  0.24 0.380 0.62 1.4
## Clean          0.18  0.24  0.12  0.39 0.254 0.75 2.3
## Social_Power   -0.23  0.62  0.10  0.13 0.463 0.54 1.4
## Wealth        -0.05  0.65 -0.18  0.08 0.464 0.54 1.2
## Authority      0.06  0.48  0.08  0.36 0.369 0.63 2.0
## Public_Image   0.09  0.50 -0.04  0.33 0.372 0.63 1.8
```

```

## Ambitious      0.58  0.32  0.06  0.15  0.468  0.53  1.7
## Influential    0.28  0.35  0.21  0.25  0.305  0.69  3.5
## Capable        0.45  0.40  0.10  0.16  0.396  0.60  2.4
## Successful     0.48  0.54  0.03  0.12  0.535  0.46  2.1
## Pleasure       0.18  0.53  0.18 -0.06  0.351  0.65  1.5
## Enjoy_Life     0.39  0.39  0.20 -0.17  0.377  0.62  2.9
## Self-Indulgent -0.16  0.45  0.07  0.08  0.240  0.76  1.3
## Exciting_Life  0.29  0.44  0.46 -0.10  0.500  0.50  2.8
## Varied_Life    0.22  0.31  0.53 -0.08  0.435  0.57  2.0
## Daring         0.05  0.29  0.49  0.06  0.323  0.68  1.7
## Freedom        0.60  0.25  0.29  0.00  0.504  0.50  1.8
## Creativity     0.23  0.16  0.58  0.03  0.419  0.58  1.5
## Independent    0.39  0.29  0.20  0.02  0.277  0.72  2.4
## Choose_Own_Goals 0.47  0.26  0.22 -0.02  0.343  0.66  2.0
## Curious        0.19  0.18  0.61  0.04  0.436  0.56  1.4
##
##              PA1  PA2  PA3  PA4
## SS loadings    6.73 3.91 3.74 3.72
## Proportion Var  0.15 0.09 0.08 0.08
## Cumulative Var  0.15 0.23 0.31 0.39
## Proportion Explained 0.37 0.22 0.21 0.21
## Cumulative Proportion 0.37 0.59 0.79 1.00
##
## Mean item complexity = 1.9
## Test of the hypothesis that 4 factors are sufficient.
##
## The degrees of freedom for the null model are 1035 and the objective function was 19.86 with Chi S
## The degrees of freedom for the model are 857 and the objective function was 4.29
##
## The root mean square of the residuals (RMSR) is 0.04
## The df corrected root mean square of the residuals is 0.05
##
## The harmonic number of observations is 538 with the empirical chi square 1946 with prob < 2e-86
## The total number of observations was 538 with Likelihood Chi Square = 2221 with prob < 1.1e-121
##
## Tucker Lewis Index of factoring reliability = 0.822
## RMSEA index = 0.056 and the 90 % confidence intervals are 0.052 0.057
## BIC = -3167
## Fit based upon off diagonal values = 0.97
## Measures of factor score adequacy
##              PA1  PA2  PA3
## Correlation of (regression) scores with factors 0.94 0.92 0.91
## Multiple R square of scores with factors 0.88 0.85 0.83
## Minimum correlation of possible factor scores 0.77 0.71 0.66
##              PA4
## Correlation of (regression) scores with factors 0.91
## Multiple R square of scores with factors 0.82
## Minimum correlation of possible factor scores 0.64

fa.sort(fit_FA_6, polar = FALSE)

## Factor Analysis using method = pa
## Call: fa(r = SVI[, 2:47], nfactors = 4, rotate = "varimax", fm = "pa")
## Standardized loadings (pattern matrix) based upon correlation matrix

```

##	PA1	PA2	PA3	PA4	h2	u2	com
## Honest	0.72	0.00	0.06	0.18	0.553	0.45	1.1
## Helpful	0.64	-0.19	0.24	0.20	0.539	0.46	1.7
## Equality	0.64	-0.15	0.34	-0.03	0.549	0.45	1.7
## Freedom	0.60	0.25	0.29	0.00	0.504	0.50	1.8
## Loyal	0.59	0.10	0.01	0.21	0.409	0.59	1.3
## Responsible	0.59	0.20	0.03	0.30	0.472	0.53	1.7
## Ambitious	0.58	0.32	0.06	0.15	0.468	0.53	1.7
## Family_Security	0.56	0.09	0.01	0.24	0.380	0.62	1.4
## Broad_Minded	0.55	-0.05	0.35	-0.12	0.442	0.56	1.8
## Social_Justice	0.55	-0.17	0.33	0.09	0.446	0.55	1.9
## Politeness	0.52	0.14	0.00	0.43	0.472	0.53	2.1
## Forgiving	0.48	-0.15	0.24	0.28	0.385	0.62	2.4
## Choose_Own_Goals	0.47	0.26	0.22	-0.02	0.343	0.66	2.0
## World_Peace	0.46	-0.11	0.34	0.14	0.361	0.64	2.2
## Humble	0.45	-0.11	0.11	0.37	0.373	0.63	2.2
## Capable	0.45	0.40	0.10	0.16	0.396	0.60	2.4
## Independent	0.39	0.29	0.20	0.02	0.277	0.72	2.4
## Enjoy_Life	0.39	0.39	0.20	-0.17	0.377	0.62	2.9
## Wisdom	0.38	0.19	0.26	0.25	0.308	0.69	3.2
## Wealth	-0.05	0.65	-0.18	0.08	0.464	0.54	1.2
## Social_Power	-0.23	0.62	0.10	0.13	0.463	0.54	1.4
## Successful	0.48	0.54	0.03	0.12	0.535	0.46	2.1
## Pleasure	0.18	0.53	0.18	-0.06	0.351	0.65	1.5
## Public_Image	0.09	0.50	-0.04	0.33	0.372	0.63	1.8
## Authority	0.06	0.48	0.08	0.36	0.369	0.63	2.0
## Self-Indulgent	-0.16	0.45	0.07	0.08	0.240	0.76	1.3
## Influential	0.28	0.35	0.21	0.25	0.305	0.69	3.5
## World_Of_Beauty	0.15	0.01	0.65	0.14	0.458	0.54	1.2
## Unity_With_Nature	0.01	-0.11	0.64	0.31	0.523	0.48	1.5
## Curious	0.19	0.18	0.61	0.04	0.436	0.56	1.4
## Protect_Enviroment	0.12	-0.10	0.60	0.13	0.405	0.59	1.2
## Creativity	0.23	0.16	0.58	0.03	0.419	0.58	1.5
## Varied_Life	0.22	0.31	0.53	-0.08	0.435	0.57	2.0
## Daring	0.05	0.29	0.49	0.06	0.323	0.68	1.7
## Exciting_Life	0.29	0.44	0.46	-0.10	0.500	0.50	2.8
## Respect_For_Tradition	0.07	0.12	0.10	0.66	0.458	0.54	1.1
## Respect_Elders	0.45	0.09	-0.01	0.56	0.517	0.48	2.0
## Devout	0.05	-0.06	-0.06	0.55	0.317	0.68	1.1
## Obedient	0.27	0.11	0.03	0.55	0.389	0.61	1.6
## Self-Discipline	0.37	0.14	0.14	0.47	0.391	0.61	2.3
## Accept_My_Life	0.05	0.04	0.12	0.46	0.232	0.77	1.2
## Clean	0.18	0.24	0.12	0.39	0.254	0.75	2.3
## National_Security	0.29	0.31	0.09	0.35	0.311	0.69	3.1
## Reciprocity	0.24	0.27	0.05	0.35	0.258	0.74	2.8
## Social_Order	0.13	0.33	0.11	0.35	0.262	0.74	2.5
## Moderate	-0.02	0.03	0.03	0.24	0.061	0.94	1.1
##							
##	PA1	PA2	PA3	PA4			
## SS loadings	6.73	3.91	3.74	3.72			
## Proportion Var	0.15	0.09	0.08	0.08			
## Cumulative Var	0.15	0.23	0.31	0.39			
## Proportion Explained	0.37	0.22	0.21	0.21			
## Cumulative Proportion	0.37	0.59	0.79	1.00			


```
##
## Mean item complexity = 1.9
## Test of the hypothesis that 4 factors are sufficient.
##
## The degrees of freedom for the null model are 1035 and the objective function was 19.86 with Chi S
## The degrees of freedom for the model are 857 and the objective function was 4.29
##
## The root mean square of the residuals (RMSR) is 0.04
## The df corrected root mean square of the residuals is 0.05
##
## The harmonic number of observations is 538 with the empirical chi square 1946 with prob < 2e-86
## The total number of observations was 538 with Likelihood Chi Square = 2221 with prob < 1.1e-121
##
## Tucker Lewis Index of factoring reliability = 0.822
## RMSEA index = 0.056 and the 90 % confidence intervals are 0.052 0.057
## BIC = -3167
## Fit based upon off diagonal values = 0.97
## Measures of factor score adequacy
##
## Correlation of (regression) scores with factors PA1 PA2 PA3
## Multiple R square of scores with factors 0.94 0.92 0.91
## Minimum correlation of possible factor scores 0.88 0.85 0.83
##
## Correlation of (regression) scores with factors PA4
## Multiple R square of scores with factors 0.77 0.71 0.66
## Minimum correlation of possible factor scores 0.91
## Multiple R square of scores with factors 0.82
## Minimum correlation of possible factor scores 0.64
```

```
fit_FA_7 <- fa(SVI[, 2:47], nfactors = 4, rotate = "varimax", fm = "minres")
fit_FA_7

## Factor Analysis using method = minres
## Call: fa(r = SVI[, 2:47], nfactors = 4, rotate = "varimax", fm = "minres")
## Standardized loadings (pattern matrix) based upon correlation matrix
##
## MR1 MR2 MR3 MR4 h2 u2 com
## Equality 0.64 -0.15 0.34 -0.03 0.549 0.45 1.7
## World_Peace 0.46 -0.11 0.34 0.14 0.361 0.64 2.2
## Unity_With_Nature 0.01 -0.11 0.64 0.31 0.524 0.48 1.5
## Wisdom 0.38 0.19 0.26 0.25 0.308 0.69 3.2
## World_Of_Beauty 0.15 0.01 0.65 0.14 0.458 0.54 1.2
## Social_Justice 0.55 -0.17 0.33 0.09 0.446 0.55 1.9
## Broad_Minded 0.55 -0.05 0.35 -0.12 0.442 0.56 1.8
## Protect_Enviroment 0.12 -0.10 0.60 0.13 0.405 0.59 1.2
## Loyal 0.59 0.10 0.01 0.21 0.409 0.59 1.3
## Honest 0.72 0.00 0.06 0.18 0.553 0.45 1.1
## Helpful 0.64 -0.19 0.24 0.20 0.539 0.46 1.7
## Responsible 0.59 0.20 0.03 0.30 0.472 0.53 1.7
## Forgiving 0.48 -0.15 0.24 0.28 0.385 0.62 2.4
## Respect_For_Tradition 0.07 0.12 0.10 0.66 0.458 0.54 1.1
## Moderate -0.02 0.03 0.03 0.24 0.061 0.94 1.1
## Humble 0.46 -0.11 0.11 0.37 0.373 0.63 2.2
## Accept_My_Life 0.05 0.04 0.12 0.46 0.232 0.77 1.2
## Devout 0.05 -0.06 -0.06 0.55 0.317 0.68 1.1
## Self-Discipline 0.37 0.14 0.14 0.47 0.391 0.61 2.3
```

```

## Respect_Elders      0.45  0.09 -0.01  0.56 0.517 0.48 2.0
## Obedient            0.27  0.11  0.03  0.55 0.389 0.61 1.6
## Politeness          0.52  0.14  0.00  0.43 0.472 0.53 2.1
## Social_Order         0.13  0.33  0.11  0.35 0.262 0.74 2.5
## National_Security    0.29  0.31  0.09  0.35 0.311 0.69 3.1
## Reciprocity          0.24  0.27  0.05  0.35 0.258 0.74 2.8
## Family_Security      0.56  0.09  0.01  0.24 0.380 0.62 1.4
## Clean               0.18  0.24  0.12  0.39 0.254 0.75 2.3
## Social_Power        -0.23  0.62  0.10  0.13 0.463 0.54 1.4
## Wealth              -0.05  0.65 -0.18  0.08 0.464 0.54 1.2
## Authority           0.06  0.48  0.08  0.36 0.369 0.63 2.0
## Public_Image         0.09  0.50 -0.04  0.33 0.372 0.63 1.8
## Ambitious           0.58  0.32  0.06  0.15 0.468 0.53 1.7
## Influential          0.28  0.35  0.21  0.25 0.305 0.69 3.5
## Capable             0.45  0.40  0.10  0.16 0.396 0.60 2.4
## Successful           0.48  0.54  0.03  0.12 0.535 0.46 2.1
## Pleasure            0.18  0.53  0.18 -0.06 0.351 0.65 1.5
## Enjoy_Life          0.39  0.39  0.20 -0.17 0.377 0.62 2.9
## Self-Indulgent      -0.16  0.45  0.07  0.08 0.240 0.76 1.3
## Exciting_Life        0.29  0.44  0.46 -0.10 0.500 0.50 2.8
## Varied_Life          0.22  0.31  0.53 -0.08 0.435 0.57 2.0
## Daring              0.05  0.29  0.49  0.06 0.323 0.68 1.7
## Freedom             0.60  0.25  0.29  0.00 0.505 0.50 1.8
## Creativity           0.23  0.16  0.58  0.03 0.419 0.58 1.5
## Independent          0.39  0.29  0.20  0.02 0.277 0.72 2.4
## Choose_Own_Goals     0.47  0.26  0.22 -0.02 0.343 0.66 2.0
## Curious             0.19  0.18  0.61  0.04 0.436 0.56 1.4
##
##
## MR1 MR2 MR3 MR4
## SS loadings          6.73 3.91 3.74 3.72
## Proportion Var       0.15 0.09 0.08 0.08
## Cumulative Var       0.15 0.23 0.31 0.39
## Proportion Explained 0.37 0.22 0.21 0.21
## Cumulative Proportion 0.37 0.59 0.79 1.00
##
## Mean item complexity = 1.9
## Test of the hypothesis that 4 factors are sufficient.
##
## The degrees of freedom for the null model are 1035 and the objective function was 19.86 with Chi S
## The degrees of freedom for the model are 857 and the objective function was 4.29
##
## The root mean square of the residuals (RMSR) is 0.04
## The df corrected root mean square of the residuals is 0.05
##
## The harmonic number of observations is 538 with the empirical chi square 1946 with prob < 2e-86
## The total number of observations was 538 with Likelihood Chi Square = 2221 with prob < 1.1e-121
##
## Tucker Lewis Index of factoring reliability = 0.822
## RMSEA index = 0.056 and the 90 % confidence intervals are 0.052 0.057
## BIC = -3167
## Fit based upon off diagonal values = 0.97
## Measures of factor score adequacy
##
## MR1 MR2 MR3
## Correlation of (regression) scores with factors 0.94 0.92 0.91

```

```

## Multiple R square of scores with factors      0.88 0.85 0.83
## Minimum correlation of possible factor scores 0.77 0.71 0.66
##                                             MR4
## Correlation of (regression) scores with factors 0.91
## Multiple R square of scores with factors      0.82
## Minimum correlation of possible factor scores 0.64

fa.sort(fit_FA_7, polar = FALSE)

## Factor Analysis using method = minres
## Call: fa(r = SVI[, 2:47], nfactors = 4, rotate = "varimax", fm = "minres")
## Standardized loadings (pattern matrix) based upon correlation matrix
##
##      MR1   MR2   MR3   MR4   h2   u2 com
## Honest      0.72  0.00  0.06  0.18 0.553 0.45 1.1
## Helpful      0.64 -0.19  0.24  0.20 0.539 0.46 1.7
## Equality     0.64 -0.15  0.34 -0.03 0.549 0.45 1.7
## Freedom      0.60  0.25  0.29  0.00 0.505 0.50 1.8
## Loyal        0.59  0.10  0.01  0.21 0.409 0.59 1.3
## Responsible  0.59  0.20  0.03  0.30 0.472 0.53 1.7
## Ambitious    0.58  0.32  0.06  0.15 0.468 0.53 1.7
## Family_Security 0.56  0.09  0.01  0.24 0.380 0.62 1.4
## Broad_Minded 0.55 -0.05  0.35 -0.12 0.442 0.56 1.8
## Social_Justice 0.55 -0.17  0.33  0.09 0.446 0.55 1.9
## Politeness   0.52  0.14  0.00  0.43 0.472 0.53 2.1
## Forgiving    0.48 -0.15  0.24  0.28 0.385 0.62 2.4
## Choose_Own_Goals 0.47  0.26  0.22 -0.02 0.343 0.66 2.0
## World_Peace  0.46 -0.11  0.34  0.14 0.361 0.64 2.2
## Humble       0.46 -0.11  0.11  0.37 0.373 0.63 2.2
## Capable      0.45  0.40  0.10  0.16 0.396 0.60 2.4
## Independent  0.39  0.29  0.20  0.02 0.277 0.72 2.4
## Enjoy_Life   0.39  0.39  0.20 -0.17 0.377 0.62 2.9
## Wisdom       0.38  0.19  0.26  0.25 0.308 0.69 3.2
## Wealth       -0.05  0.65 -0.18  0.08 0.464 0.54 1.2
## Social_Power -0.23  0.62  0.10  0.13 0.463 0.54 1.4
## Successful   0.48  0.54  0.03  0.12 0.535 0.46 2.1
## Pleasure     0.18  0.53  0.18 -0.06 0.351 0.65 1.5
## Public_Image 0.09  0.50 -0.04  0.33 0.372 0.63 1.8
## Authority    0.06  0.48  0.08  0.36 0.369 0.63 2.0
## Self-Indulgent -0.16  0.45  0.07  0.08 0.240 0.76 1.3
## Influential  0.28  0.35  0.21  0.25 0.305 0.69 3.5
## World_Of_Beauty 0.15  0.01  0.65  0.14 0.458 0.54 1.2
## Unity_With_Nature 0.01 -0.11  0.64  0.31 0.524 0.48 1.5
## Curious      0.19  0.18  0.61  0.04 0.436 0.56 1.4
## Protect_Enviroment 0.12 -0.10  0.60  0.13 0.405 0.59 1.2
## Creativity   0.23  0.16  0.58  0.03 0.419 0.58 1.5
## Varied_Life  0.22  0.31  0.53 -0.08 0.435 0.57 2.0
## Daring       0.05  0.29  0.49  0.06 0.323 0.68 1.7
## Exciting_Life 0.29  0.44  0.46 -0.10 0.500 0.50 2.8
## Respect_For_Tradition 0.07  0.12  0.10  0.66 0.458 0.54 1.1
## Respect_Elders 0.45  0.09 -0.01  0.56 0.517 0.48 2.0
## Devout       0.05 -0.06 -0.06  0.55 0.317 0.68 1.1
## Obedient     0.27  0.11  0.03  0.55 0.389 0.61 1.6
## Self-Discipline 0.37  0.14  0.14  0.47 0.391 0.61 2.3
## Accept_My_Life 0.05  0.04  0.12  0.46 0.232 0.77 1.2

```

```

## Clean      0.18  0.24  0.12  0.39 0.254 0.75 2.3
## National_Security 0.29  0.31  0.09  0.35 0.311 0.69 3.1
## Reciprocity  0.24  0.27  0.05  0.35 0.258 0.74 2.8
## Social_Order 0.13  0.33  0.11  0.35 0.262 0.74 2.5
## Moderate    -0.02  0.03  0.03  0.24 0.061 0.94 1.1
##
##           MR1  MR2  MR3  MR4
## SS loadings      6.73 3.91 3.74 3.72
## Proportion Var    0.15 0.09 0.08 0.08
## Cumulative Var    0.15 0.23 0.31 0.39
## Proportion Explained 0.37 0.22 0.21 0.21
## Cumulative Proportion 0.37 0.59 0.79 1.00
##
## Mean item complexity = 1.9
## Test of the hypothesis that 4 factors are sufficient.
##
## The degrees of freedom for the null model are 1035 and the objective function was 19.86 with Chi S
## The degrees of freedom for the model are 857 and the objective function was 4.29
##
## The root mean square of the residuals (RMSR) is 0.04
## The df corrected root mean square of the residuals is 0.05
##
## The harmonic number of observations is 538 with the empirical chi square 1946 with prob < 2e-86
## The total number of observations was 538 with Likelihood Chi Square = 2221 with prob < 1.1e-121
##
## Tucker Lewis Index of factoring reliability = 0.822
## RMSEA index = 0.056 and the 90 % confidence intervals are 0.052 0.057
## BIC = -3167
## Fit based upon off diagonal values = 0.97
## Measures of factor score adequacy
##
##           MR1  MR2  MR3
## Correlation of (regression) scores with factors 0.94 0.92 0.91
## Multiple R square of scores with factors        0.88 0.85 0.83
## Minimum correlation of possible factor scores    0.77 0.71 0.66
##
##           MR4
## Correlation of (regression) scores with factors 0.91
## Multiple R square of scores with factors        0.82
## Minimum correlation of possible factor scores    0.64

```

```

fit_FA_8 <- fa(SVI[, 2:47], nfactors = 4, rotate = "varimax", fm = "wls")
fit_FA_8

## Factor Analysis using method = wls
## Call: fa(r = SVI[, 2:47], nfactors = 4, rotate = "varimax", fm = "wls")
## Standardized loadings (pattern matrix) based upon correlation matrix
##
##      WLS1  WLS2  WLS3  WLS4    h2    u2 com
## Equality  0.64 -0.15  0.34 -0.03 0.551 0.45 1.7
## World_Peace 0.46 -0.11  0.34  0.14 0.361 0.64 2.2
## Unity_With_Nature 0.01 -0.11  0.64  0.31 0.525 0.47 1.5
## Wisdom      0.38  0.19  0.26  0.25 0.308 0.69 3.2
## World_Of_Beauty 0.15  0.02  0.65  0.14 0.459 0.54 1.2
## Social_Justice 0.55 -0.17  0.33  0.09 0.448 0.55 1.9
## Broad_Minded 0.55 -0.05  0.35 -0.13 0.444 0.56 1.8

```

```

## Protect_Enviroment      0.12 -0.10  0.61  0.13 0.409 0.59 1.2
## Loyal                   0.59  0.10  0.00  0.21 0.409 0.59 1.3
## Honest                  0.72  0.01  0.06  0.18 0.553 0.45 1.1
## Helpful                 0.64 -0.18  0.24  0.20 0.540 0.46 1.7
## Responsible             0.59  0.20  0.02  0.30 0.472 0.53 1.7
## Forgiving               0.48 -0.15  0.24  0.28 0.385 0.61 2.4
## Respect_For_Tradition  0.07  0.12  0.10  0.66 0.461 0.54 1.1
## Moderate               -0.02  0.03  0.03  0.24 0.061 0.94 1.1
## Humble                  0.46 -0.11  0.11  0.37 0.373 0.63 2.2
## Accept_My_Life          0.05  0.04  0.12  0.46 0.231 0.77 1.2
## Devout                  0.05 -0.07 -0.06  0.56 0.320 0.68 1.1
## Self-Discipline         0.37  0.14  0.14  0.47 0.391 0.61 2.3
## Respect_Elders          0.45  0.09 -0.01  0.56 0.518 0.48 2.0
## Obedient                0.27  0.11  0.03  0.55 0.388 0.61 1.6
## Politeness              0.52  0.14  0.00  0.43 0.471 0.53 2.1
## Social_Order            0.13  0.34  0.11  0.35 0.261 0.74 2.5
## National_Security       0.29  0.31  0.09  0.35 0.311 0.69 3.1
## Reciprocity             0.24  0.28  0.05  0.35 0.258 0.74 2.8
## Family_Security         0.56  0.09  0.01  0.24 0.380 0.62 1.4
## Clean                   0.18  0.24  0.12  0.39 0.254 0.75 2.3
## Social_Power            -0.23  0.62  0.10  0.13 0.459 0.54 1.4
## Wealth                  -0.05  0.65 -0.18  0.08 0.461 0.54 1.2
## Authority               0.06  0.48  0.08  0.36 0.368 0.63 2.0
## Public_Image            0.09  0.50 -0.04  0.33 0.371 0.63 1.8
## Ambitious               0.58  0.32  0.05  0.15 0.468 0.53 1.7
## Influential             0.28  0.35  0.21  0.25 0.305 0.69 3.5
## Capable                 0.45  0.40  0.10  0.16 0.397 0.60 2.4
## Successful              0.48  0.54  0.03  0.12 0.535 0.47 2.1
## Pleasure                0.18  0.53  0.18 -0.06 0.350 0.65 1.5
## Enjoy_Life              0.39  0.39  0.20 -0.17 0.376 0.62 2.9
## Self-Indulgent          -0.16  0.45  0.07  0.08 0.239 0.76 1.4
## Exciting_Life           0.28  0.44  0.46 -0.10 0.498 0.50 2.8
## Varied_Life             0.21  0.31  0.53 -0.08 0.433 0.57 2.0
## Daring                  0.05  0.29  0.48  0.06 0.323 0.68 1.7
## Freedom                 0.60  0.25  0.29  0.00 0.504 0.50 1.8
## Creativity              0.23  0.17  0.58  0.03 0.418 0.58 1.5
## Independent             0.39  0.29  0.20  0.02 0.277 0.72 2.4
## Choose_Own_Goals        0.47  0.26  0.22 -0.02 0.342 0.66 2.0
## Curious                 0.19  0.18  0.61  0.04 0.434 0.57 1.4
##
##
## WLS1 WLS2 WLS3 WLS4
## SS loadings      6.73 3.92 3.74 3.72
## Proportion Var   0.15 0.09 0.08 0.08
## Cumulative Var   0.15 0.23 0.31 0.39
## Proportion Explained 0.37 0.22 0.21 0.21
## Cumulative Proportion 0.37 0.59 0.79 1.00
##
## Mean item complexity = 1.9
## Test of the hypothesis that 4 factors are sufficient.
##
## The degrees of freedom for the null model are 1035 and the objective function was 19.86 with Chi S
## The degrees of freedom for the model are 857 and the objective function was 4.29
##
## The root mean square of the residuals (RMSR) is 0.04

```

```

## The df corrected root mean square of the residuals is  0.05
##
## The harmonic number of observations is  538 with the empirical chi square  1946  with prob <  2e-86
## The total number of observations was  538  with Likelihood Chi Square =  2221  with prob <  1.3e-121
##
## Tucker Lewis Index of factoring reliability =  0.822
## RMSEA index =  0.056  and the 90 % confidence intervals are  0.052 0.057
## BIC =  -3168
## Fit based upon off diagonal values = 0.97
## Measures of factor score adequacy
##
##                                     WLS1 WLS2 WLS3
## Correlation of (regression) scores with factors  0.94 0.92 0.91
## Multiple R square of scores with factors          0.88 0.85 0.83
## Minimum correlation of possible factor scores      0.77 0.70 0.67
##
##                                     WLS4
## Correlation of (regression) scores with factors  0.91
## Multiple R square of scores with factors          0.82
## Minimum correlation of possible factor scores      0.64

fa.sort(fit_FA_8, polar = FALSE)

## Factor Analysis using method = wls
## Call: fa(r = SVI[, 2:47], nfactors = 4, rotate = "varimax", fm = "wls")
## Standardized loadings (pattern matrix) based upon correlation matrix
##
##          WLS1  WLS2  WLS3  WLS4    h2    u2 com
## Honest      0.72  0.01  0.06  0.18 0.553 0.45 1.1
## Equality    0.64 -0.15  0.34 -0.03 0.551 0.45 1.7
## Helpful     0.64 -0.18  0.24  0.20 0.540 0.46 1.7
## Freedom     0.60  0.25  0.29  0.00 0.504 0.50 1.8
## Loyal       0.59  0.10  0.00  0.21 0.409 0.59 1.3
## Responsible 0.59  0.20  0.02  0.30 0.472 0.53 1.7
## Ambitious   0.58  0.32  0.05  0.15 0.468 0.53 1.7
## Family_Security 0.56  0.09  0.01  0.24 0.380 0.62 1.4
## Broad_Minded 0.55 -0.05  0.35 -0.13 0.444 0.56 1.8
## Social_Justice 0.55 -0.17  0.33  0.09 0.448 0.55 1.9
## Politeness  0.52  0.14  0.00  0.43 0.471 0.53 2.1
## Forgiving   0.48 -0.15  0.24  0.28 0.385 0.61 2.4
## Choose_Own_Goals 0.47  0.26  0.22 -0.02 0.342 0.66 2.0
## World_Peace  0.46 -0.11  0.34  0.14 0.361 0.64 2.2
## Humble      0.46 -0.11  0.11  0.37 0.373 0.63 2.2
## Capable     0.45  0.40  0.10  0.16 0.397 0.60 2.4
## Independent 0.39  0.29  0.20  0.02 0.277 0.72 2.4
## Wisdom      0.38  0.19  0.26  0.25 0.308 0.69 3.2
## Wealth     -0.05  0.65 -0.18  0.08 0.461 0.54 1.2
## Social_Power -0.23  0.62  0.10  0.13 0.459 0.54 1.4
## Successful  0.48  0.54  0.03  0.12 0.535 0.47 2.1
## Pleasure    0.18  0.53  0.18 -0.06 0.350 0.65 1.5
## Public_Image 0.09  0.50 -0.04  0.33 0.371 0.63 1.8
## Authority   0.06  0.48  0.08  0.36 0.368 0.63 2.0
## Self-Indulgent -0.16  0.45  0.07  0.08 0.239 0.76 1.4
## Enjoy_Life  0.39  0.39  0.20 -0.17 0.376 0.62 2.9
## Influential 0.28  0.35  0.21  0.25 0.305 0.69 3.5
## World_Of_Beauty 0.15  0.02  0.65  0.14 0.459 0.54 1.2
## Unity_With_Nature 0.01 -0.11  0.64  0.31 0.525 0.47 1.5

```

```

## Protect_Enviroment      0.12 -0.10  0.61  0.13 0.409 0.59 1.2
## Curious                 0.19  0.18  0.61  0.04 0.434 0.57 1.4
## Creativity              0.23  0.17  0.58  0.03 0.418 0.58 1.5
## Varied_Life             0.21  0.31  0.53 -0.08 0.433 0.57 2.0
## Daring                  0.05  0.29  0.48  0.06 0.323 0.68 1.7
## Exciting_Life           0.28  0.44  0.46 -0.10 0.498 0.50 2.8
## Respect_For_Tradition   0.07  0.12  0.10  0.66 0.461 0.54 1.1
## Respect_Elders          0.45  0.09 -0.01  0.56 0.518 0.48 2.0
## Devout                  0.05 -0.07 -0.06  0.56 0.320 0.68 1.1
## Obedient                0.27  0.11  0.03  0.55 0.388 0.61 1.6
## Self-Discipline         0.37  0.14  0.14  0.47 0.391 0.61 2.3
## Accept_My_Life          0.05  0.04  0.12  0.46 0.231 0.77 1.2
## Clean                   0.18  0.24  0.12  0.39 0.254 0.75 2.3
## National_Security       0.29  0.31  0.09  0.35 0.311 0.69 3.1
## Reciprocity             0.24  0.28  0.05  0.35 0.258 0.74 2.8
## Social_Order            0.13  0.34  0.11  0.35 0.261 0.74 2.5
## Moderate                -0.02  0.03  0.03  0.24 0.061 0.94 1.1
##
##
## WLS1 WLS2 WLS3 WLS4
## SS loadings             6.73 3.92 3.74 3.72
## Proportion Var          0.15 0.09 0.08 0.08
## Cumulative Var          0.15 0.23 0.31 0.39
## Proportion Explained    0.37 0.22 0.21 0.21
## Cumulative Proportion   0.37 0.59 0.79 1.00
##
## Mean item complexity = 1.9
## Test of the hypothesis that 4 factors are sufficient.
##
## The degrees of freedom for the null model are 1035 and the objective function was 19.86 with Chi S
## The degrees of freedom for the model are 857 and the objective function was 4.29
##
## The root mean square of the residuals (RMSR) is 0.04
## The df corrected root mean square of the residuals is 0.05
##
## The harmonic number of observations is 538 with the empirical chi square 1946 with prob < 2e-86
## The total number of observations was 538 with Likelihood Chi Square = 2221 with prob < 1.3e-121
##
## Tucker Lewis Index of factoring reliability = 0.822
## RMSEA index = 0.056 and the 90 % confidence intervals are 0.052 0.057
## BIC = -3168
## Fit based upon off diagonal values = 0.97
## Measures of factor score adequacy
##
## WLS1 WLS2 WLS3
## Correlation of (regression) scores with factors 0.94 0.92 0.91
## Multiple R square of scores with factors 0.88 0.85 0.83
## Minimum correlation of possible factor scores 0.77 0.70 0.67
##
## WLS4
## Correlation of (regression) scores with factors 0.91
## Multiple R square of scores with factors 0.82
## Minimum correlation of possible factor scores 0.64

```

```

fit_FA_9 <- fa(SVI[, 2:47], nfactors = 4, rotate = "varimax", fm = "ml")
fit_FA_9

```

```

## Factor Analysis using method = ml
## Call: fa(r = SVI[, 2:47], nfactors = 4, rotate = "varimax", fm = "ml")
## Standardized loadings (pattern matrix) based upon correlation matrix
##
##      ML1    ML2    ML4    ML3    h2    u2    com
## Equality      0.65 -0.14 -0.04    0.34 0.559 0.44 1.6
## World_Peace    0.47 -0.10  0.14    0.34 0.364 0.64 2.1
## Unity_With_Nature 0.02 -0.11  0.31    0.65 0.528 0.47 1.5
## Wisdom         0.37  0.20  0.26    0.25 0.308 0.69 3.3
## World_Of_Beauty 0.15  0.02  0.14    0.65 0.464 0.54 1.2
## Social_Justice 0.56 -0.16  0.08    0.33 0.455 0.54 1.9
## Broad_Minded   0.56 -0.04 -0.13    0.34 0.456 0.54 1.8
## Protect_Enviroment 0.12 -0.09  0.14    0.61 0.419 0.58 1.2
## Loyal          0.59  0.11  0.22    0.00 0.413 0.59 1.3
## Honest         0.72  0.02  0.19    0.05 0.555 0.45 1.1
## Helpful        0.65 -0.18  0.20    0.23 0.546 0.45 1.6
## Responsible    0.58  0.21  0.31    0.02 0.472 0.53 1.8
## Forgiving      0.49 -0.14  0.28    0.23 0.388 0.61 2.3
## Respect_For_Tradition 0.06  0.11  0.66    0.10 0.467 0.53 1.1
## Moderate      -0.02  0.03  0.23    0.03 0.057 0.94 1.1
## Humble         0.46 -0.11  0.37    0.11 0.376 0.62 2.2
## Accept_My_Life 0.05  0.03  0.46    0.12 0.225 0.77 1.2
## Devout         0.04 -0.07  0.56   -0.06 0.329 0.67 1.1
## Self-Discipline 0.36  0.15  0.47    0.13 0.387 0.61 2.3
## Respect_Elders 0.44  0.10  0.57   -0.01 0.522 0.48 2.0
## Obedient       0.27  0.12  0.55    0.03 0.385 0.62 1.6
## Politeness     0.51  0.15  0.44    0.00 0.471 0.53 2.1
## Social_Order   0.12  0.33  0.35    0.12 0.259 0.74 2.5
## National_Security 0.28  0.31  0.35    0.09 0.307 0.69 3.1
## Reciprocity    0.23  0.28  0.35    0.05 0.257 0.74 2.7
## Family_Security 0.55  0.11  0.25    0.01 0.382 0.62 1.5
## Clean          0.17  0.24  0.39    0.12 0.255 0.74 2.3
## Social_Power   -0.24  0.60  0.12    0.10 0.448 0.55 1.5
## Wealth         -0.07  0.64  0.08   -0.18 0.454 0.55 1.2
## Authority      0.06  0.48  0.35    0.08 0.363 0.64 1.9
## Public_Image   0.08  0.50  0.33   -0.04 0.366 0.63 1.8
## Ambitious      0.57  0.34  0.16    0.05 0.469 0.53 1.8
## Influential    0.27  0.36  0.25    0.20 0.305 0.70 3.4
## Capable        0.43  0.42  0.17    0.10 0.399 0.60 2.4
## Successful     0.46  0.55  0.13    0.03 0.532 0.47 2.1
## Pleasure       0.18  0.53 -0.06    0.18 0.345 0.66 1.5
## Enjoy_Life     0.38  0.40 -0.16    0.20 0.373 0.63 2.8
## Self-Indulgent -0.17  0.44  0.07    0.07 0.232 0.77 1.4
## Exciting_Life  0.28  0.45 -0.09    0.45 0.490 0.51 2.7
## Varied_Life    0.21  0.32 -0.07    0.52 0.428 0.57 2.1
## Daring         0.05  0.29  0.06    0.48 0.322 0.68 1.7
## Freedom       0.59  0.27  0.00    0.29 0.505 0.50 1.9
## Creativity     0.23  0.18  0.04    0.58 0.416 0.58 1.5
## Independent    0.39  0.30  0.02    0.19 0.277 0.72 2.4
## Choose_Own_Goals 0.47  0.27 -0.02    0.22 0.339 0.66 2.1
## Curious        0.19  0.19  0.04    0.60 0.429 0.57 1.4
##
##      ML1    ML2    ML4    ML3
## SS loadings    6.66 3.99 3.76 3.70
## Proportion Var 0.14 0.09 0.08 0.08

```



```

## Cumulative Var      0.14 0.23 0.31 0.39
## Proportion Explained 0.37 0.22 0.21 0.20
## Cumulative Proportion 0.37 0.59 0.80 1.00
##
## Mean item complexity = 1.9
## Test of the hypothesis that 4 factors are sufficient.
##
## The degrees of freedom for the null model are 1035 and the objective function was 19.86 with Chi S
## The degrees of freedom for the model are 857 and the objective function was 4.28
##
## The root mean square of the residuals (RMSR) is 0.04
## The df corrected root mean square of the residuals is 0.05
##
## The harmonic number of observations is 538 with the empirical chi square 1954 with prob < 2.2e-87
## The total number of observations was 538 with Likelihood Chi Square = 2219 with prob < 2.3e-121
##
## Tucker Lewis Index of factoring reliability = 0.822
## RMSEA index = 0.056 and the 90 % confidence intervals are 0.052 0.057
## BIC = -3170
## Fit based upon off diagonal values = 0.97
## Measures of factor score adequacy
##
## Correlation of (regression) scores with factors ML1 ML2 ML4
## Multiple R square of scores with factors 0.94 0.92 0.91
## Minimum correlation of possible factor scores 0.88 0.85 0.82
## ML3
## Correlation of (regression) scores with factors 0.77 0.70 0.64
## Multiple R square of scores with factors 0.91
## Minimum correlation of possible factor scores 0.83
## ML3
## Correlation of (regression) scores with factors 0.66
## Multiple R square of scores with factors
## Minimum correlation of possible factor scores

fa.sort(fit_FA_9, polar = FALSE)

## Factor Analysis using method = ml
## Call: fa(r = SVI[, 2:47], nfactors = 4, rotate = "varimax", fm = "ml")
## Standardized loadings (pattern matrix) based upon correlation matrix
##
## ML1 ML2 ML4 ML3 h2 u2 com
## Honest 0.72 0.02 0.19 0.05 0.555 0.45 1.1
## Equality 0.65 -0.14 -0.04 0.34 0.559 0.44 1.6
## Helpful 0.65 -0.18 0.20 0.23 0.546 0.45 1.6
## Freedom 0.59 0.27 0.00 0.29 0.505 0.50 1.9
## Loyal 0.59 0.11 0.22 0.00 0.413 0.59 1.3
## Responsible 0.58 0.21 0.31 0.02 0.472 0.53 1.8
## Ambitious 0.57 0.34 0.16 0.05 0.469 0.53 1.8
## Broad_Minded 0.56 -0.04 -0.13 0.34 0.456 0.54 1.8
## Social_Justice 0.56 -0.16 0.08 0.33 0.455 0.54 1.9
## Family_Security 0.55 0.11 0.25 0.01 0.382 0.62 1.5
## Politeness 0.51 0.15 0.44 0.00 0.471 0.53 2.1
## Forgiving 0.49 -0.14 0.28 0.23 0.388 0.61 2.3
## World_Peace 0.47 -0.10 0.14 0.34 0.364 0.64 2.1
## Choose_Own_Goals 0.47 0.27 -0.02 0.22 0.339 0.66 2.1
## Humble 0.46 -0.11 0.37 0.11 0.376 0.62 2.2
## Capable 0.43 0.42 0.17 0.10 0.399 0.60 2.4
## Independent 0.39 0.30 0.02 0.19 0.277 0.72 2.4
## Wisdom 0.37 0.20 0.26 0.25 0.308 0.69 3.3

```

```

## Wealth -0.07 0.64 0.08 -0.18 0.454 0.55 1.2
## Social_Power -0.24 0.60 0.12 0.10 0.448 0.55 1.5
## Successful 0.46 0.55 0.13 0.03 0.532 0.47 2.1
## Pleasure 0.18 0.53 -0.06 0.18 0.345 0.66 1.5
## Public_Image 0.08 0.50 0.33 -0.04 0.366 0.63 1.8
## Authority 0.06 0.48 0.35 0.08 0.363 0.64 1.9
## Self-Indulgent -0.17 0.44 0.07 0.07 0.232 0.77 1.4
## Enjoy_Life 0.38 0.40 -0.16 0.20 0.373 0.63 2.8
## Influential 0.27 0.36 0.25 0.20 0.305 0.70 3.4
## Respect_For_Tradition 0.06 0.11 0.66 0.10 0.467 0.53 1.1
## Respect_Elders 0.44 0.10 0.57 -0.01 0.522 0.48 2.0
## Devout 0.04 -0.07 0.56 -0.06 0.329 0.67 1.1
## Obedient 0.27 0.12 0.55 0.03 0.385 0.62 1.6
## Self-Discipline 0.36 0.15 0.47 0.13 0.387 0.61 2.3
## Accept_My_Life 0.05 0.03 0.46 0.12 0.225 0.77 1.2
## Clean 0.17 0.24 0.39 0.12 0.255 0.74 2.3
## Reciprocity 0.23 0.28 0.35 0.05 0.257 0.74 2.7
## National_Security 0.28 0.31 0.35 0.09 0.307 0.69 3.1
## Social_Order 0.12 0.33 0.35 0.12 0.259 0.74 2.5
## Moderate -0.02 0.03 0.23 0.03 0.057 0.94 1.1
## World_Of_Beauty 0.15 0.02 0.14 0.65 0.464 0.54 1.2
## Unity_With_Nature 0.02 -0.11 0.31 0.65 0.528 0.47 1.5
## Protect_Enviroment 0.12 -0.09 0.14 0.61 0.419 0.58 1.2
## Curious 0.19 0.19 0.04 0.60 0.429 0.57 1.4
## Creativity 0.23 0.18 0.04 0.58 0.416 0.58 1.5
## Varied_Life 0.21 0.32 -0.07 0.52 0.428 0.57 2.1
## Daring 0.05 0.29 0.06 0.48 0.322 0.68 1.7
## Exciting_Life 0.28 0.45 -0.09 0.45 0.490 0.51 2.7
##
## ML1 ML2 ML4 ML3
## SS loadings 6.66 3.99 3.76 3.70
## Proportion Var 0.14 0.09 0.08 0.08
## Cumulative Var 0.14 0.23 0.31 0.39
## Proportion Explained 0.37 0.22 0.21 0.20
## Cumulative Proportion 0.37 0.59 0.80 1.00
##
## Mean item complexity = 1.9
## Test of the hypothesis that 4 factors are sufficient.
##
## The degrees of freedom for the null model are 1035 and the objective function was 19.86 with Chi S
## The degrees of freedom for the model are 857 and the objective function was 4.28
##
## The root mean square of the residuals (RMSR) is 0.04
## The df corrected root mean square of the residuals is 0.05
##
## The harmonic number of observations is 538 with the empirical chi square 1954 with prob < 2.2e-87
## The total number of observations was 538 with Likelihood Chi Square = 2219 with prob < 2.3e-121
##
## Tucker Lewis Index of factoring reliability = 0.822
## RMSEA index = 0.056 and the 90 % confidence intervals are 0.052 0.057
## BIC = -3170
## Fit based upon off diagonal values = 0.97
## Measures of factor score adequacy
## ML1 ML2 ML4

```

```
## Correlation of (regression) scores with factors    0.94 0.92 0.91
## Multiple R square of scores with factors          0.88 0.85 0.82
## Minimum correlation of possible factor scores      0.77 0.70 0.64
##                                                    ML3
## Correlation of (regression) scores with factors    0.91
## Multiple R square of scores with factors          0.83
## Minimum correlation of possible factor scores      0.66
```

```
fit_FA_10 <- fa(SVI[, 2:47], nfactors = 4, rotate = "varimax", fm = "uls")
fit_FA_10
```

```
## Factor Analysis using method = uls
## Call: fa(r = SVI[, 2:47], nfactors = 4, rotate = "varimax", fm = "uls")
## Standardized loadings (pattern matrix) based upon correlation matrix
##              ULS1  ULS2  ULS3  ULS4    h2    u2 com
## Equality      0.64 -0.15  0.34 -0.03 0.549 0.45 1.7
## World_Peace   0.46 -0.11  0.34  0.14 0.361 0.64 2.2
## Unity_With_Nature 0.01 -0.11  0.64  0.31 0.524 0.48 1.5
## Wisdom        0.38  0.19  0.26  0.25 0.308 0.69 3.2
## World_Of_Beauty 0.15  0.01  0.65  0.14 0.458 0.54 1.2
## Social_Justice 0.55 -0.17  0.33  0.09 0.446 0.55 1.9
## Broad_Minded   0.55 -0.05  0.35 -0.12 0.442 0.56 1.8
## Protect_Enviroment 0.12 -0.10  0.60  0.13 0.405 0.59 1.2
## Loyal          0.59  0.10  0.01  0.21 0.409 0.59 1.3
## Honest         0.72  0.00  0.06  0.18 0.553 0.45 1.1
## Helpful        0.64 -0.19  0.24  0.20 0.539 0.46 1.7
## Responsible    0.59  0.20  0.03  0.30 0.472 0.53 1.7
## Forgiving      0.48 -0.15  0.24  0.28 0.385 0.62 2.4
## Respect_For_Tradition 0.07  0.12  0.10  0.66 0.458 0.54 1.1
## Moderate      -0.02  0.03  0.03  0.24 0.061 0.94 1.1
## Humble         0.46 -0.11  0.11  0.37 0.373 0.63 2.2
## Accept_My_Life 0.05  0.04  0.12  0.46 0.232 0.77 1.2
## Devout         0.05 -0.06 -0.06  0.55 0.317 0.68 1.1
## Self-Discipline 0.37  0.14  0.14  0.47 0.391 0.61 2.3
## Respect_Elders 0.45  0.09 -0.01  0.56 0.517 0.48 2.0
## Obedient       0.27  0.11  0.03  0.55 0.389 0.61 1.6
## Politeness     0.52  0.14  0.00  0.43 0.472 0.53 2.1
## Social_Order   0.13  0.33  0.11  0.35 0.262 0.74 2.5
## National_Security 0.29  0.31  0.09  0.35 0.311 0.69 3.1
## Reciprocity    0.24  0.27  0.05  0.35 0.258 0.74 2.8
## Family_Security 0.56  0.09  0.01  0.24 0.380 0.62 1.4
## Clean          0.18  0.24  0.12  0.39 0.254 0.75 2.3
## Social_Power   -0.23  0.62  0.10  0.13 0.463 0.54 1.4
## Wealth        -0.05  0.65 -0.18  0.08 0.464 0.54 1.2
## Authority      0.06  0.48  0.08  0.36 0.369 0.63 2.0
## Public_Image   0.09  0.50 -0.04  0.33 0.372 0.63 1.8
## Ambitious      0.58  0.32  0.06  0.15 0.468 0.53 1.7
## Influential    0.28  0.35  0.21  0.25 0.305 0.69 3.5
## Capable        0.45  0.40  0.10  0.16 0.396 0.60 2.4
## Successful     0.48  0.54  0.03  0.12 0.535 0.46 2.1
## Pleasure       0.18  0.53  0.18 -0.06 0.351 0.65 1.5
## Enjoy_Life     0.39  0.39  0.20 -0.17 0.377 0.62 2.9
## Self-Indulgent -0.16  0.45  0.07  0.08 0.240 0.76 1.3
```

```

## Exciting_Life      0.29  0.44  0.46 -0.10 0.500 0.50 2.8
## Varied_Life       0.22  0.31  0.53 -0.08 0.435 0.57 2.0
## Daring            0.05  0.29  0.49  0.06 0.323 0.68 1.7
## Freedom          0.60  0.25  0.29  0.00 0.505 0.50 1.8
## Creativity        0.23  0.16  0.58  0.03 0.419 0.58 1.5
## Independent       0.39  0.29  0.20  0.02 0.277 0.72 2.4
## Choose_Own_Goals  0.47  0.26  0.22 -0.02 0.343 0.66 2.0
## Curious           0.19  0.18  0.61  0.04 0.436 0.56 1.4
##
##                      ULS1 ULS2 ULS3 ULS4
## SS loadings          6.73 3.91 3.74 3.72
## Proportion Var       0.15 0.09 0.08 0.08
## Cumulative Var       0.15 0.23 0.31 0.39
## Proportion Explained 0.37 0.22 0.21 0.21
## Cumulative Proportion 0.37 0.59 0.79 1.00
##
## Mean item complexity = 1.9
## Test of the hypothesis that 4 factors are sufficient.
##
## The degrees of freedom for the null model are 1035 and the objective function was 19.86 with Chi S
## The degrees of freedom for the model are 857 and the objective function was 4.29
##
## The root mean square of the residuals (RMSR) is 0.04
## The df corrected root mean square of the residuals is 0.05
##
## The harmonic number of observations is 538 with the empirical chi square 1946 with prob < 2e-86
## The total number of observations was 538 with Likelihood Chi Square = 2221 with prob < 1.1e-121
##
## Tucker Lewis Index of factoring reliability = 0.822
## RMSEA index = 0.056 and the 90 % confidence intervals are 0.052 0.057
## BIC = -3167
## Fit based upon off diagonal values = 0.97
## Measures of factor score adequacy
##
##                      ULS1 ULS2 ULS3
## Correlation of (regression) scores with factors 0.94 0.92 0.91
## Multiple R square of scores with factors        0.88 0.85 0.83
## Minimum correlation of possible factor scores    0.77 0.71 0.66
##
##                      ULS4
## Correlation of (regression) scores with factors 0.91
## Multiple R square of scores with factors        0.82
## Minimum correlation of possible factor scores    0.64

fa.sort(fit_FA_10, polar = FALSE)

## Factor Analysis using method = uls
## Call: fa(r = SVI[, 2:47], nfactors = 4, rotate = "varimax", fm = "uls")
## Standardized loadings (pattern matrix) based upon correlation matrix
##
##          ULS1  ULS2  ULS3  ULS4    h2    u2 com
## Honest      0.72  0.00  0.06  0.18 0.553 0.45 1.1
## Helpful     0.64 -0.19  0.24  0.20 0.539 0.46 1.7
## Equality    0.64 -0.15  0.34 -0.03 0.549 0.45 1.7
## Freedom     0.60  0.25  0.29  0.00 0.505 0.50 1.8
## Loyal       0.59  0.10  0.01  0.21 0.409 0.59 1.3
## Responsible 0.59  0.20  0.03  0.30 0.472 0.53 1.7

```

```

## Ambitious          0.58  0.32  0.06  0.15  0.468  0.53  1.7
## Family_Security    0.56  0.09  0.01  0.24  0.380  0.62  1.4
## Broad_Minded       0.55 -0.05  0.35 -0.12  0.442  0.56  1.8
## Social_Justice     0.55 -0.17  0.33  0.09  0.446  0.55  1.9
## Politeness         0.52  0.14  0.00  0.43  0.472  0.53  2.1
## Forgiving          0.48 -0.15  0.24  0.28  0.385  0.62  2.4
## Choose_Own_Goals   0.47  0.26  0.22 -0.02  0.343  0.66  2.0
## World_Peace        0.46 -0.11  0.34  0.14  0.361  0.64  2.2
## Humble             0.46 -0.11  0.11  0.37  0.373  0.63  2.2
## Capable            0.45  0.40  0.10  0.16  0.396  0.60  2.4
## Independent        0.39  0.29  0.20  0.02  0.277  0.72  2.4
## Enjoy_Life         0.39  0.39  0.20 -0.17  0.377  0.62  2.9
## Wisdom             0.38  0.19  0.26  0.25  0.308  0.69  3.2
## Wealth            -0.05  0.65 -0.18  0.08  0.464  0.54  1.2
## Social_Power      -0.23  0.62  0.10  0.13  0.463  0.54  1.4
## Successful         0.48  0.54  0.03  0.12  0.535  0.46  2.1
## Pleasure           0.18  0.53  0.18 -0.06  0.351  0.65  1.5
## Public_Image       0.09  0.50 -0.04  0.33  0.372  0.63  1.8
## Authority          0.06  0.48  0.08  0.36  0.369  0.63  2.0
## Self-Indulgent    -0.16  0.45  0.07  0.08  0.240  0.76  1.3
## Influential        0.28  0.35  0.21  0.25  0.305  0.69  3.5
## World_Of_Beauty    0.15  0.01  0.65  0.14  0.458  0.54  1.2
## Unity_With_Nature  0.01 -0.11  0.64  0.31  0.524  0.48  1.5
## Curious            0.19  0.18  0.61  0.04  0.436  0.56  1.4
## Protect_Enviroment 0.12 -0.10  0.60  0.13  0.405  0.59  1.2
## Creativity         0.23  0.16  0.58  0.03  0.419  0.58  1.5
## Varied_Life        0.22  0.31  0.53 -0.08  0.435  0.57  2.0
## Daring             0.05  0.29  0.49  0.06  0.323  0.68  1.7
## Exciting_Life      0.29  0.44  0.46 -0.10  0.500  0.50  2.8
## Respect_For_Tradition 0.07  0.12  0.10  0.66  0.458  0.54  1.1
## Respect_Elders     0.45  0.09 -0.01  0.56  0.517  0.48  2.0
## Devout             0.05 -0.06 -0.06  0.55  0.317  0.68  1.1
## Obedient           0.27  0.11  0.03  0.55  0.389  0.61  1.6
## Self-Discipline    0.37  0.14  0.14  0.47  0.391  0.61  2.3
## Accept_My_Life     0.05  0.04  0.12  0.46  0.232  0.77  1.2
## Clean              0.18  0.24  0.12  0.39  0.254  0.75  2.3
## National_Security  0.29  0.31  0.09  0.35  0.311  0.69  3.1
## Reciprocity        0.24  0.27  0.05  0.35  0.258  0.74  2.8
## Social_Order       0.13  0.33  0.11  0.35  0.262  0.74  2.5
## Moderate          -0.02  0.03  0.03  0.24  0.061  0.94  1.1
##
##
## ULS1 ULS2 ULS3 ULS4
## SS loadings      6.73 3.91 3.74 3.72
## Proportion Var   0.15 0.09 0.08 0.08
## Cumulative Var   0.15 0.23 0.31 0.39
## Proportion Explained 0.37 0.22 0.21 0.21
## Cumulative Proportion 0.37 0.59 0.79 1.00
##
## Mean item complexity = 1.9
## Test of the hypothesis that 4 factors are sufficient.
##
## The degrees of freedom for the null model are 1035 and the objective function was 19.86 with Chi S
## The degrees of freedom for the model are 857 and the objective function was 4.29
##

```

```
## The root mean square of the residuals (RMSR) is 0.04
## The df corrected root mean square of the residuals is 0.05
##
## The harmonic number of observations is 538 with the empirical chi square 1946 with prob < 2e-86
## The total number of observations was 538 with Likelihood Chi Square = 2221 with prob < 1.1e-121
##
## Tucker Lewis Index of factoring reliability = 0.822
## RMSEA index = 0.056 and the 90 % confidence intervals are 0.052 0.057
## BIC = -3167
## Fit based upon off diagonal values = 0.97
## Measures of factor score adequacy
##
## ULS1 ULS2 ULS3
## Correlation of (regression) scores with factors 0.94 0.92 0.91
## Multiple R square of scores with factors 0.88 0.85 0.83
## Minimum correlation of possible factor scores 0.77 0.71 0.66
##
## ULS4
## Correlation of (regression) scores with factors 0.91
## Multiple R square of scores with factors 0.82
## Minimum correlation of possible factor scores 0.64
```

```
fit_FA_11 <- fa(SVI[, 2:47], nfactors = 4, rotate = "varimax", fm = "glis")
fit_FA_11
```

```
## Factor Analysis using method = glis
## Call: fa(r = SVI[, 2:47], nfactors = 4, rotate = "varimax", fm = "glis")
## Standardized loadings (pattern matrix) based upon correlation matrix
##
## GLS1 GLS2 GLS3 GLS4 h2 u2 com
## Equality 0.64 -0.16 0.35 -0.03 0.551 0.45 1.7
## World_Peace 0.47 -0.12 0.34 0.14 0.371 0.63 2.2
## Unity_With_Nature 0.02 -0.11 0.63 0.31 0.507 0.49 1.5
## Wisdom 0.38 0.19 0.26 0.26 0.312 0.69 3.2
## World_Of_Beauty 0.15 0.01 0.65 0.14 0.465 0.54 1.2
## Social_Justice 0.55 -0.18 0.34 0.09 0.458 0.54 2.0
## Broad_Minded 0.55 -0.06 0.35 -0.13 0.447 0.55 1.8
## Protect_Enviroment 0.11 -0.10 0.61 0.14 0.412 0.59 1.2
## Loyal 0.59 0.10 0.01 0.21 0.408 0.59 1.3
## Honest 0.72 0.00 0.06 0.18 0.551 0.45 1.1
## Helpful 0.64 -0.19 0.24 0.20 0.541 0.46 1.7
## Responsible 0.60 0.19 0.02 0.30 0.482 0.52 1.7
## Forgiving 0.48 -0.15 0.24 0.28 0.390 0.61 2.4
## Respect_For_Tradition 0.07 0.12 0.10 0.65 0.452 0.55 1.1
## Moderate -0.02 0.03 0.03 0.25 0.066 0.93 1.1
## Humble 0.46 -0.12 0.11 0.38 0.377 0.62 2.2
## Accept_My_Life 0.05 0.03 0.12 0.47 0.240 0.76 1.2
## Devout 0.04 -0.07 -0.06 0.57 0.333 0.67 1.1
## Self-Discipline 0.37 0.13 0.14 0.47 0.395 0.60 2.3
## Respect_Elders 0.45 0.09 -0.01 0.55 0.516 0.48 2.0
## Obedient 0.27 0.11 0.03 0.55 0.391 0.61 1.6
## Politeness 0.52 0.14 0.00 0.43 0.469 0.53 2.1
## Social_Order 0.13 0.34 0.11 0.36 0.270 0.73 2.5
## National_Security 0.29 0.31 0.09 0.36 0.319 0.68 3.0
## Reciprocity 0.24 0.27 0.05 0.35 0.260 0.74 2.8
## Family_Security 0.57 0.09 0.01 0.24 0.390 0.61 1.4
```

```

## Clean      0.18  0.24  0.12  0.39  0.255  0.74  2.3
## Social_Power -0.23  0.62  0.10  0.13  0.462  0.54  1.4
## Wealth      -0.04  0.65 -0.18  0.08  0.459  0.54  1.2
## Authority    0.06  0.49  0.08  0.37  0.382  0.62  2.0
## Public_Image  0.09  0.50 -0.04  0.34  0.375  0.62  1.8
## Ambitious    0.59  0.32  0.05  0.15  0.474  0.53  1.7
## Influential  0.28  0.35  0.21  0.25  0.312  0.69  3.5
## Capable      0.45  0.40  0.10  0.16  0.404  0.60  2.3
## Successful   0.48  0.53  0.03  0.12  0.535  0.47  2.1
## Pleasure     0.19  0.54  0.18 -0.07  0.364  0.64  1.5
## Enjoy_Life   0.40  0.40  0.20 -0.18  0.396  0.60  2.9
## Self-Indulgent -0.16  0.46  0.07  0.08  0.249  0.75  1.3
## Exciting_Life 0.29  0.44  0.47 -0.10  0.510  0.49  2.8
## Varied_Life  0.21  0.31  0.54 -0.08  0.435  0.56  2.0
## Daring       0.04  0.29  0.50  0.06  0.345  0.66  1.6
## Freedom      0.60  0.24  0.29  0.00  0.506  0.49  1.8
## Creativity   0.23  0.16  0.59  0.03  0.424  0.58  1.5
## Independent  0.40  0.29  0.20  0.01  0.284  0.72  2.3
## Choose_Own_Goals 0.48  0.26  0.22 -0.03  0.348  0.65  2.0
## Curious      0.18  0.17  0.61  0.04  0.442  0.56  1.4
##
##
##          GLS1 GLS2 GLS3 GLS4
## SS loadings      6.81 3.96 3.81 3.76
## Proportion Var    0.15 0.09 0.08 0.08
## Cumulative Var    0.15 0.23 0.32 0.40
## Proportion Explained 0.37 0.22 0.21 0.21
## Cumulative Proportion 0.37 0.59 0.79 1.00
##
## Mean item complexity = 1.9
## Test of the hypothesis that 4 factors are sufficient.
##
## The degrees of freedom for the null model are 1035 and the objective function was 19.86 with Chi S
## The degrees of freedom for the model are 857 and the objective function was 4.29
##
## The root mean square of the residuals (RMSR) is 0.04
## The df corrected root mean square of the residuals is 0.05
##
## The harmonic number of observations is 538 with the empirical chi square 1958 with prob < 7.6e-8
## The total number of observations was 538 with Likelihood Chi Square = 2224 with prob < 4.8e-122
##
## Tucker Lewis Index of factoring reliability = 0.822
## RMSEA index = 0.056 and the 90 % confidence intervals are 0.052 0.057
## BIC = -3164
## Fit based upon off diagonal values = 0.97
## Measures of factor score adequacy
##
##          GLS1 GLS2 GLS3
## Correlation of (regression) scores with factors 0.95 0.93 0.92
## Multiple R square of scores with factors      0.89 0.87 0.85
## Minimum correlation of possible factor scores 0.79 0.73 0.69
##
##          GLS4
## Correlation of (regression) scores with factors 0.91
## Multiple R square of scores with factors      0.83
## Minimum correlation of possible factor scores 0.67

```

```

fa.sort(fit_FA_11, polar = FALSE)

## Factor Analysis using method = gls
## Call: fa(r = SVI[, 2:47], nfactors = 4, rotate = "varimax", fm = "gls")
## Standardized loadings (pattern matrix) based upon correlation matrix
##
##      GLS1  GLS2  GLS3  GLS4    h2    u2 com
## Honest      0.72  0.00  0.06  0.18 0.551 0.45 1.1
## Helpful      0.64 -0.19  0.24  0.20 0.541 0.46 1.7
## Equality      0.64 -0.16  0.35 -0.03 0.551 0.45 1.7
## Freedom      0.60  0.24  0.29  0.00 0.506 0.49 1.8
## Responsible  0.60  0.19  0.02  0.30 0.482 0.52 1.7
## Loyal         0.59  0.10  0.01  0.21 0.408 0.59 1.3
## Ambitious     0.59  0.32  0.05  0.15 0.474 0.53 1.7
## Family_Security 0.57  0.09  0.01  0.24 0.390 0.61 1.4
## Broad_Minded  0.55 -0.06  0.35 -0.13 0.447 0.55 1.8
## Social_Justice 0.55 -0.18  0.34  0.09 0.458 0.54 2.0
## Politeness    0.52  0.14  0.00  0.43 0.469 0.53 2.1
## Choose_Own_Goals 0.48  0.26  0.22 -0.03 0.348 0.65 2.0
## Forgiving     0.48 -0.15  0.24  0.28 0.390 0.61 2.4
## World_Peace   0.47 -0.12  0.34  0.14 0.371 0.63 2.2
## Humble        0.46 -0.12  0.11  0.38 0.377 0.62 2.2
## Capable       0.45  0.40  0.10  0.16 0.404 0.60 2.3
## Enjoy_Life    0.40  0.40  0.20 -0.18 0.396 0.60 2.9
## Independent   0.40  0.29  0.20  0.01 0.284 0.72 2.3
## Wisdom        0.38  0.19  0.26  0.26 0.312 0.69 3.2
## Wealth       -0.04  0.65 -0.18  0.08 0.459 0.54 1.2
## Social_Power -0.23  0.62  0.10  0.13 0.462 0.54 1.4
## Pleasure      0.19  0.54  0.18 -0.07 0.364 0.64 1.5
## Successful    0.48  0.53  0.03  0.12 0.535 0.47 2.1
## Public_Image  0.09  0.50 -0.04  0.34 0.375 0.62 1.8
## Authority     0.06  0.49  0.08  0.37 0.382 0.62 2.0
## Self-Indulgent -0.16  0.46  0.07  0.08 0.249 0.75 1.3
## Influential   0.28  0.35  0.21  0.25 0.312 0.69 3.5
## World_Of_Beauty 0.15  0.01  0.65  0.14 0.465 0.54 1.2
## Unity_With_Nature 0.02 -0.11  0.63  0.31 0.507 0.49 1.5
## Curious       0.18  0.17  0.61  0.04 0.442 0.56 1.4
## Protect_Enviroment 0.11 -0.10  0.61  0.14 0.412 0.59 1.2
## Creativity    0.23  0.16  0.59  0.03 0.424 0.58 1.5
## Varied_Life   0.21  0.31  0.54 -0.08 0.435 0.56 2.0
## Daring        0.04  0.29  0.50  0.06 0.345 0.66 1.6
## Exciting_Life 0.29  0.44  0.47 -0.10 0.510 0.49 2.8
## Respect_For_Tradition 0.07  0.12  0.10  0.65 0.452 0.55 1.1
## Devout        0.04 -0.07 -0.06  0.57 0.333 0.67 1.1
## Respect_Elders 0.45  0.09 -0.01  0.55 0.516 0.48 2.0
## Obedient      0.27  0.11  0.03  0.55 0.391 0.61 1.6
## Accept_My_Life 0.05  0.03  0.12  0.47 0.240 0.76 1.2
## Self-Discipline 0.37  0.13  0.14  0.47 0.395 0.60 2.3
## Clean         0.18  0.24  0.12  0.39 0.255 0.74 2.3
## National_Security 0.29  0.31  0.09  0.36 0.319 0.68 3.0
## Social_Order  0.13  0.34  0.11  0.36 0.270 0.73 2.5
## Reciprocity   0.24  0.27  0.05  0.35 0.260 0.74 2.8
## Moderate     -0.02  0.03  0.03  0.25 0.066 0.93 1.1
##
##      GLS1 GLS2 GLS3 GLS4

```



```

## SS loadings          6.81 3.96 3.81 3.76
## Proportion Var      0.15 0.09 0.08 0.08
## Cumulative Var      0.15 0.23 0.32 0.40
## Proportion Explained 0.37 0.22 0.21 0.21
## Cumulative Proportion 0.37 0.59 0.79 1.00
##
## Mean item complexity = 1.9
## Test of the hypothesis that 4 factors are sufficient.
##
## The degrees of freedom for the null model are 1035 and the objective function was 19.86 with Chi S
## The degrees of freedom for the model are 857 and the objective function was 4.29
##
## The root mean square of the residuals (RMSR) is 0.04
## The df corrected root mean square of the residuals is 0.05
##
## The harmonic number of observations is 538 with the empirical chi square 1958 with prob < 7.6e-8
## The total number of observations was 538 with Likelihood Chi Square = 2224 with prob < 4.8e-122
##
## Tucker Lewis Index of factoring reliability = 0.822
## RMSEA index = 0.056 and the 90 % confidence intervals are 0.052 0.057
## BIC = -3164
## Fit based upon off diagonal values = 0.97
## Measures of factor score adequacy
##
## Correlation of (regression) scores with factors    GLS1 GLS2 GLS3
## Multiple R square of scores with factors          0.95 0.93 0.92
## Minimum correlation of possible factor scores      0.89 0.87 0.85
##
## Correlation of (regression) scores with factors    GLS4
## Multiple R square of scores with factors          0.79 0.73 0.69
## Minimum correlation of possible factor scores      0.91
## Multiple R square of scores with factors          0.83
## Minimum correlation of possible factor scores      0.67

```

```

fit_FA_12 <- fa(SVI[, 2:47], nfactors = 4, rotate = "varimax", fm = "alpha")
fit_FA_12

```

```

## Factor Analysis using method = alpha
## Call: fa(r = SVI[, 2:47], nfactors = 4, rotate = "varimax", fm = "alpha")
## Standardized loadings (pattern matrix) based upon correlation matrix
##
##          alpha1 alpha2 alpha4 alpha3    h2    u2 com
## Equality      0.61  -0.16   0.36   0.00 0.530 0.47 1.8
## World_Peace    0.46  -0.12   0.33   0.15 0.359 0.64 2.2
## Unity_With_Nature -0.01 -0.11   0.65   0.35 0.549 0.45 1.6
## Wisdom         0.39   0.18   0.25   0.25 0.309 0.69 3.1
## World_Of_Beauty  0.14   0.01   0.64   0.14 0.451 0.55 1.2
## Social_Justice  0.55  -0.17   0.34   0.08 0.448 0.55 2.0
## Broad_Minded    0.51  -0.07   0.37  -0.07 0.401 0.60 1.9
## Protect_Enviroment 0.11 -0.09   0.59   0.14 0.388 0.61 1.2
## Loyal          0.61   0.09   0.01   0.18 0.414 0.59 1.2
## Honest         0.72  -0.01   0.07   0.17 0.551 0.45 1.1
## Helpful        0.63  -0.18   0.25   0.18 0.532 0.47 1.7
## Responsible    0.60   0.18   0.03   0.28 0.473 0.53 1.7
## Forgiving      0.46  -0.14   0.25   0.29 0.377 0.62 2.6
## Respect_For_Tradition 0.10  0.14   0.07   0.62 0.415 0.58 1.2

```

```

## Moderate      -0.03   0.03   0.03   0.27 0.074 0.93 1.1
## Humble        0.43  -0.11   0.13   0.41 0.380 0.62 2.3
## Accept_My_Life 0.02   0.05   0.13   0.51 0.281 0.72 1.1
## Devout        0.08  -0.05  -0.08   0.50 0.260 0.74 1.1
## Self-Discipline 0.36   0.13   0.14   0.50 0.419 0.58 2.2
## Respect_Elders 0.46   0.09  -0.01   0.53 0.505 0.50 2.0
## Obedient      0.28   0.11   0.03   0.54 0.383 0.62 1.6
## Politeness    0.52   0.15   0.01   0.43 0.472 0.53 2.1
## Social_Order   0.14   0.34   0.10   0.35 0.267 0.73 2.5
## National_Security 0.30   0.32   0.08   0.34 0.312 0.69 3.1
## Reciprocity    0.25   0.28   0.05   0.35 0.264 0.74 2.8
## Family_Security 0.57   0.07   0.02   0.23 0.376 0.62 1.4
## Clean         0.18   0.24   0.11   0.39 0.258 0.74 2.3
## Social_Power  -0.22   0.63   0.09   0.12 0.476 0.52 1.4
## Wealth        -0.03   0.66  -0.19   0.07 0.473 0.53 1.2
## Authority      0.09   0.48   0.07   0.33 0.358 0.64 1.9
## Public_Image   0.11   0.51  -0.05   0.31 0.371 0.63 1.8
## Ambitious      0.59   0.30   0.06   0.14 0.466 0.53 1.6
## Influential    0.31   0.35   0.19   0.20 0.297 0.70 3.2
## Capable        0.45   0.38   0.11   0.16 0.390 0.61 2.4
## Successful     0.50   0.53   0.03   0.10 0.538 0.46 2.1
## Pleasure       0.17   0.54   0.19  -0.05 0.357 0.64 1.5
## Enjoy_Life     0.38   0.38   0.22  -0.17 0.369 0.63 3.0
## Self-Indulgent -0.16   0.46   0.07   0.09 0.254 0.75 1.4
## Exciting_Life  0.30   0.44   0.47  -0.14 0.523 0.48 2.9
## Varied_Life    0.23   0.31   0.54  -0.11 0.449 0.55 2.1
## Daring         0.06   0.28   0.47   0.04 0.309 0.69 1.7
## Freedom        0.60   0.23   0.30   0.01 0.501 0.50 1.8
## Creativity     0.23   0.15   0.58   0.03 0.418 0.58 1.5
## Independent    0.39   0.27   0.21   0.03 0.273 0.73 2.4
## Choose_Own_Goals 0.49   0.25   0.23  -0.05 0.360 0.64 2.0
## Curious        0.18   0.17   0.62   0.04 0.442 0.56 1.3
##
##
##          alpha1 alpha2 alpha4 alpha3
## SS loadings      6.75   3.90   3.81   3.62
## Proportion Var    0.15   0.08   0.08   0.08
## Cumulative Var    0.15   0.23   0.31   0.39
## Proportion Explained 0.37   0.22   0.21   0.20
## Cumulative Proportion 0.37   0.59   0.80   1.00
##
## Mean item complexity = 1.9
## Test of the hypothesis that 4 factors are sufficient.
##
## The degrees of freedom for the null model are 1035 and the objective function was 19.86 with Chi S
## The degrees of freedom for the model are 857 and the objective function was 4.34
##
## The root mean square of the residuals (RMSR) is 0.04
## The df corrected root mean square of the residuals is 0.05
##
## The harmonic number of observations is 538 with the empirical chi square 2006 with prob < 7.6e-94
## The total number of observations was 538 with Likelihood Chi Square = 2250 with prob < 1.7e-125
##
## Tucker Lewis Index of factoring reliability = 0.818
## RMSEA index = 0.057 and the 90 % confidence intervals are 0.052 0.058

```

```

## BIC = -3139
## Fit based upon off diagonal values = 0.97
## Measures of factor score adequacy
##
## Correlation of (regression) scores with factors      alpha1 alpha2
## Multiple R square of scores with factors            0.94  0.93
## Minimum correlation of possible factor scores        0.89  0.86
##
## Correlation of (regression) scores with factors      alpha4 alpha3
## Multiple R square of scores with factors            0.77  0.71
## Minimum correlation of possible factor scores        0.92  0.91
##
## Correlation of (regression) scores with factors      0.84  0.83
## Multiple R square of scores with factors            0.68  0.66
## Minimum correlation of possible factor scores

fa.sort(fit_FA_12, polar = FALSE)

## Factor Analysis using method = alpha
## Call: fa(r = SVI[, 2:47], nfactors = 4, rotate = "varimax", fm = "alpha")
## Standardized loadings (pattern matrix) based upon correlation matrix
##
##          alpha1 alpha2 alpha4 alpha3      h2      u2 com
## Honest      0.72  -0.01   0.07   0.17 0.551 0.45 1.1
## Helpful      0.63  -0.18   0.25   0.18 0.532 0.47 1.7
## Loyal        0.61   0.09   0.01   0.18 0.414 0.59 1.2
## Equality     0.61  -0.16   0.36   0.00 0.530 0.47 1.8
## Responsible  0.60   0.18   0.03   0.28 0.473 0.53 1.7
## Freedom      0.60   0.23   0.30   0.01 0.501 0.50 1.8
## Ambitious    0.59   0.30   0.06   0.14 0.466 0.53 1.6
## Family_Security 0.57   0.07   0.02   0.23 0.376 0.62 1.4
## Social_Justice 0.55  -0.17   0.34   0.08 0.448 0.55 2.0
## Politeness   0.52   0.15   0.01   0.43 0.472 0.53 2.1
## Broad_Minded 0.51  -0.07   0.37  -0.07 0.401 0.60 1.9
## Choose_Own_Goals 0.49   0.25   0.23  -0.05 0.360 0.64 2.0
## World_Peace   0.46  -0.12   0.33   0.15 0.359 0.64 2.2
## Forgiving     0.46  -0.14   0.25   0.29 0.377 0.62 2.6
## Capable       0.45   0.38   0.11   0.16 0.390 0.61 2.4
## Humble        0.43  -0.11   0.13   0.41 0.380 0.62 2.3
## Independent   0.39   0.27   0.21   0.03 0.273 0.73 2.4
## Wisdom        0.39   0.18   0.25   0.25 0.309 0.69 3.1
## Enjoy_Life    0.38   0.38   0.22  -0.17 0.369 0.63 3.0
## Wealth       -0.03   0.66  -0.19   0.07 0.473 0.53 1.2
## Social_Power -0.22   0.63   0.09   0.12 0.476 0.52 1.4
## Pleasure      0.17   0.54   0.19  -0.05 0.357 0.64 1.5
## Successful    0.50   0.53   0.03   0.10 0.538 0.46 2.1
## Public_Image  0.11   0.51  -0.05   0.31 0.371 0.63 1.8
## Authority     0.09   0.48   0.07   0.33 0.358 0.64 1.9
## Self-Indulgent -0.16   0.46   0.07   0.09 0.254 0.75 1.4
## Influential   0.31   0.35   0.19   0.20 0.297 0.70 3.2
## Unity_With_Nature -0.01  -0.11   0.65   0.35 0.549 0.45 1.6
## World_Of_Beauty 0.14   0.01   0.64   0.14 0.451 0.55 1.2
## Curious       0.18   0.17   0.62   0.04 0.442 0.56 1.3
## Protect_Enviroment 0.11  -0.09   0.59   0.14 0.388 0.61 1.2
## Creativity    0.23   0.15   0.58   0.03 0.418 0.58 1.5
## Varied_Life   0.23   0.31   0.54  -0.11 0.449 0.55 2.1
## Exciting_Life 0.30   0.44   0.47  -0.14 0.523 0.48 2.9
## Daring        0.06   0.28   0.47   0.04 0.309 0.69 1.7
## Respect_For_Tradition 0.10   0.14   0.07   0.62 0.415 0.58 1.2

```

```

## Obedient          0.28   0.11   0.03   0.54 0.383 0.62 1.6
## Respect_Elders    0.46   0.09  -0.01   0.53 0.505 0.50 2.0
## Accept_My_Life    0.02   0.05   0.13   0.51 0.281 0.72 1.1
## Self-Discipline    0.36   0.13   0.14   0.50 0.419 0.58 2.2
## Devout            0.08  -0.05  -0.08   0.50 0.260 0.74 1.1
## Clean            0.18   0.24   0.11   0.39 0.258 0.74 2.3
## Reciprocity       0.25   0.28   0.05   0.35 0.264 0.74 2.8
## Social_Order      0.14   0.34   0.10   0.35 0.267 0.73 2.5
## National_Security 0.30   0.32   0.08   0.34 0.312 0.69 3.1
## Moderate         -0.03   0.03   0.03   0.27 0.074 0.93 1.1
##
##
##              alpha1 alpha2 alpha4 alpha3
## SS loadings      6.75   3.90   3.81   3.62
## Proportion Var    0.15   0.08   0.08   0.08
## Cumulative Var    0.15   0.23   0.31   0.39
## Proportion Explained 0.37   0.22   0.21   0.20
## Cumulative Proportion 0.37   0.59   0.80   1.00
##
## Mean item complexity = 1.9
## Test of the hypothesis that 4 factors are sufficient.
##
## The degrees of freedom for the null model are 1035 and the objective function was 19.86 with Chi S
## The degrees of freedom for the model are 857 and the objective function was 4.34
##
## The root mean square of the residuals (RMSR) is 0.04
## The df corrected root mean square of the residuals is 0.05
##
## The harmonic number of observations is 538 with the empirical chi square 2006 with prob < 7.6e-9
## The total number of observations was 538 with Likelihood Chi Square = 2250 with prob < 1.7e-125
##
## Tucker Lewis Index of factoring reliability = 0.818
## RMSEA index = 0.057 and the 90 % confidence intervals are 0.052 0.058
## BIC = -3139
## Fit based upon off diagonal values = 0.97
## Measures of factor score adequacy
##
##              alpha1 alpha2
## Correlation of (regression) scores with factors 0.94 0.93
## Multiple R square of scores with factors 0.89 0.86
## Minimum correlation of possible factor scores 0.77 0.71
##
##              alpha4 alpha3
## Correlation of (regression) scores with factors 0.92 0.91
## Multiple R square of scores with factors 0.84 0.83
## Minimum correlation of possible factor scores 0.68 0.66

```

```

loadings <- cbind(fit_FA_6$Structure, fit_FA_7$Structure, fit_FA_8$Structure,
  fit_FA_9$Structure)

loadings <- loadings[, c(1, 5, 9, 13, 2, 6, 10, 14, 3, 7, 11, 16,
  4, 8, 12, 15)]
loadings <- as.data.frame(loadings)
names(loadings) <- c("PA1", "MR1", "WL1", "ML1", "PA2", "MR2", "WL2",
  "ML2", "PA3", "MR3", "WL3", "ML3", "PA4", "MR4", "WL4", "ML4")
cor(loadings)

```

##	PA1	MR1	WL1	ML1	PA2	MR2	WL2
## PA1	1.00000	1.00000	0.99999	0.99943	-0.3905	-0.3904	-0.3880
## MR1	1.00000	1.00000	0.99999	0.99943	-0.3906	-0.3905	-0.3880
## WL1	0.99999	0.99999	1.00000	0.99952	-0.3927	-0.3926	-0.3902
## ML1	0.99943	0.99943	0.99952	1.00000	-0.4154	-0.4154	-0.4130
## PA2	-0.39051	-0.39058	-0.39270	-0.41544	1.0000	1.0000	1.0000
## MR2	-0.39042	-0.39049	-0.39261	-0.41535	1.0000	1.0000	1.0000
## WL2	-0.38798	-0.38805	-0.39017	-0.41296	1.0000	1.0000	1.0000
## ML2	-0.36122	-0.36129	-0.36345	-0.38658	0.9993	0.9993	0.9994
## PA3	-0.04635	-0.04629	-0.04541	-0.02882	-0.3168	-0.3169	-0.3165
## MR3	-0.04643	-0.04638	-0.04549	-0.02890	-0.3169	-0.3169	-0.3166
## WL3	-0.04700	-0.04695	-0.04606	-0.02945	-0.3180	-0.3180	-0.3176
## ML3	-0.05735	-0.05729	-0.05641	-0.03975	-0.3192	-0.3192	-0.3189
## PA4	-0.16339	-0.16339	-0.16307	-0.16652	-0.2241	-0.2241	-0.2246
## MR4	-0.16341	-0.16341	-0.16309	-0.16654	-0.2241	-0.2241	-0.2246
## WL4	-0.16407	-0.16407	-0.16376	-0.16723	-0.2238	-0.2238	-0.2242
## ML4	-0.15621	-0.15621	-0.15596	-0.16001	-0.2156	-0.2157	-0.2161
##	ML2	PA3	MR3	WL3	ML3	PA4	MR4
## PA1	-0.3612	-0.04635	-0.04643	-0.04700	-0.05735	-0.1634	-0.1634
## MR1	-0.3613	-0.04629	-0.04638	-0.04695	-0.05729	-0.1634	-0.1634
## WL1	-0.3634	-0.04541	-0.04549	-0.04606	-0.05641	-0.1631	-0.1631
## ML1	-0.3866	-0.02882	-0.02890	-0.02945	-0.03975	-0.1665	-0.1665
## PA2	0.9993	-0.31684	-0.31690	-0.31796	-0.31922	-0.2241	-0.2241
## MR2	0.9993	-0.31686	-0.31692	-0.31798	-0.31924	-0.2241	-0.2241
## WL2	0.9994	-0.31651	-0.31658	-0.31764	-0.31893	-0.2246	-0.2246
## ML2	1.0000	-0.31206	-0.31213	-0.31324	-0.31491	-0.2370	-0.2370
## PA3	-0.3121	1.00000	1.00000	0.99999	0.99975	-0.4782	-0.4781
## MR3	-0.3121	1.00000	1.00000	0.99999	0.99976	-0.4781	-0.4780
## WL3	-0.3132	0.99999	0.99999	1.00000	0.99982	-0.4773	-0.4773
## ML3	-0.3149	0.99975	0.99976	0.99982	1.00000	-0.4715	-0.4715
## PA4	-0.2370	-0.47816	-0.47805	-0.47730	-0.47153	1.0000	1.0000
## MR4	-0.2370	-0.47812	-0.47801	-0.47725	-0.47149	1.0000	1.0000
## WL4	-0.2367	-0.47813	-0.47802	-0.47727	-0.47149	1.0000	1.0000
## ML4	-0.2281	-0.48345	-0.48334	-0.48262	-0.47702	0.9996	0.9996
##	WL4	ML4					
## PA1	-0.1641	-0.1562					
## MR1	-0.1641	-0.1562					
## WL1	-0.1638	-0.1560					
## ML1	-0.1672	-0.1600					
## PA2	-0.2238	-0.2156					
## MR2	-0.2238	-0.2157					
## WL2	-0.2242	-0.2161					
## ML2	-0.2367	-0.2281					
## PA3	-0.4781	-0.4834					
## MR3	-0.4780	-0.4833					
## WL3	-0.4773	-0.4826					
## ML3	-0.4715	-0.4770					
## PA4	1.0000	0.9996					
## MR4	1.0000	0.9996					
## WL4	1.0000	0.9996					
## ML4	0.9996	1.0000					

```
ggcorr(loadings, label = FALSE, angle = 90, hjust = 0.1, size = 2.5,
       digits = 2) + theme(text = element_text(size = 14, family = "sans",
       color = "black", face = "bold"), axis.text.y = element_text(colour = "black",
       size = 12, face = "bold"), axis.text.x = element_text(colour = "black",
       size = 12, face = "bold", angle = 0), axis.title.x = element_text(margin = margin(15,
       0, 0, 0), size = 16), axis.title.y = element_text(margin = margin(0,
       15, 0, 0), size = 16), axis.line.x = element_blank(), axis.line.y = element_blank(),
       plot.title = element_text(size = 16, face = "bold", margin = margin(0,
       0, 20, 0), hjust = 0.5), panel.background = element_rect(fill = "white",
       linetype = 1, color = "black"), panel.grid.major = element_blank(),
       panel.grid.minor = element_blank(), plot.background = element_rect(fill = "white"),
       plot.margin = unit(c(1, 1, 1, 1), "cm"), legend.position = "bottom",
       legend.title = element_blank()) + ggtitle("Intercorrelations Among Loadings")
```

Intercorrelations Among Loadings

