Reproducible R code – Exploratory Factor Analysis
Situated Academic Writing Self-efficacy scale
Uses the nursing student data file

```
library(psych)
library(GPArotation)
library(nFactors)


#correlation adequacy Bartlett's test
correlations = cor(nursingdata)
cortest.bartlett(correlations, n = nrow(nursingdata))

#Bartlett's test is significant which means that the correlations are large enough to do an EFA

#sampling adequacy KMO Test
KMO(correlations)
#gets a measure of sampling adequacy which needs to be >.90 to be good for all items (which it is!)

#EFA model testing

#Starting with one factor to get scree plot

fa(nursingdata,nfactors=1,rotate="oblimin",fm="pa")

mydata <-nursingdata
ev <-eigen(cor(nursingdata)) # get eigenvalues
ap <- parallel(subject=nrow(nursingdata),var=ncol(nursingdata),
          rep=100,cent=.05)
nS <-nScree(x=ev$values,aparallel=ap$eigen$qevpea)
plotnScree(nS)

#Scree suggests 1 factor, parallel analysis suggests 1 factor, Eigenvalues suggests 3 factors

# See 3 factor solution

fa(nursingdata,nfactors=3,rotate="oblimin",fm="pa")

#the three factor solution produces a situation where 1 variables does not load on any factor (14)

#2 variables cross load items 4 and 9
```

```
#attempt a 2 factor solution even though this is not really suggested

fa(nursingdata,nfactors=2,rotate="oblimin",fm="pa")
#this produces cross loadings of 1, 3, 5, 9

#Back to a three factor solution with items 4 and 9 removed
fa(SAWSESdata [ , -c(4,9)],nfactors=3,rotate="oblimin",fm="pa")

#And now item 14 doesn't load

#3 factors items 4, 9, 14 removed
fa(nursingdata [ , -c(4,9,14)],nfactors=3,rotate="oblimin",fm="pa")

#everything loads, nothing cross loads.... but I don't like item 2 -- and it lacks uniqueness and
has low communality

#3 factors items 2,4, 9, 14 removed
fa(nursingdata [ , -c(2,4,9,14)],nfactors=3,rotate="oblimin",fm="pa")

#This has great fit. And theoretical sense is OK.

#just because one factor also makes sense via parallel analysis will test that model for fit.
fa(nursingdata [ , -c(2,4,9,14)],nfactors=1,rotate="oblimin",fm="pa")

#nope RMSEA is greater than 1

#And just for fun because I would rather not remove item 14
fa(nursingdata [ , -c(2,4,9)],nfactors=3,rotate="oblimin",fm="pa")
#nope 14 doesn't load

#need to get CFI
FinalSAWSESmodel = fa(nursingdata [ , -c(2,4,9,14)],nfactors=3,rotate="oblimin",fm="pa")
1 - ((FinalSAWSESmodel$STATISTIC-FinalSAWSESmodel$dof)/
     (FinalSAWSESmodel$null.chisq-FinalSAWSESmodel$null.dof))
```